COMMUNITY HYGIENE

WOODS HUTCHINSON

GIFT OF
Publisher

EX LIBRIS

EDUCATION DEPT.

LANGE LIBRARY OF EDUCATION
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

THE WOODS HUTCHINSON HEALTH SERIES

COMMUNITY HYGIENE

BY

WOODS HUTCHINSON, A. M., M. D.

Sometime Professor of Anatomy, University of Iowa; Professor of Comparative Pathology and Methods of Science Teaching, University of Buffalo; Lecturer, London Medical Graduates' College and University of London; and State Health Officer of Oregon. Author of "Preventable Diseases," "Conquest of Consumption." "Instinct and Health," etc.

HOUGHTON MIFFLIN COMPANY

BOSTON NEW YORK CHICAGO SAN FRANCISCO

RA431
H9

COPYRIGHT, 1920, BY WOODS HUTCHINSON

Copyright, 1916, by Woods Hutchinson

ALL RIGHTS RESERVED

Thirteenth Impression
January 1923

Gift of Publishers
to
Education Dept.

The Riverside Press
CAMBRIDGE · MASSACHUSETTS
PRINTED IN THE U.S.A.

PREFACE

One of the most significant and far-reaching movements of the day is the awakening of the health conscience of the community. No matter how alert, well informed, and prudent the individual may be, he is no longer able to protect his own health or that of his family from some of the most serious dangers which threaten it. Even the most wealthy and influential citizen is utterly powerless to insure the purity of his water-supply, the proper disposal of his sewage and garbage, the purity of the milk his children drink, or the wholesomeness of the food on his table, except by the aid of the strong arm of the law acting through public officers of health. In fact, health has become a community problem.

At first sight, the wisdom of giving children information about public health may seem open to question. They have no votes; and it will be several years before they are able either to influence public opinion or vote "yes" or "no" on questions of public sanitation. Furthermore, it may be argued that they are likely to have difficulty in understanding the engineering and chemical problems involved in public sanitary measures.

These theoretical doubts, however, have little substantial foundation. While it is true that children have no votes, they are far from being unable

to influence public opinion. In fact, they are the most active and efficient teachers of their parents in particular and the community in general. "The wisdom of babes" has always had a high standing in history; and when children make up their innocent little minds that a certain line of hygienic conduct is right and proper, the community is bound to be strongly influenced in that direction.

Secondly, while some of the scientific principles involved are perhaps a little beyond their grasp, even when stated in the simplest way, the practical details of public health protection are a part of their everyday experiences, and are of direct interest to them.

Thirdly, the earlier that children can learn to coöperate with one another, with their parents and teachers, and with the community at large for the promotion of the public health, the better. The youngest child can do something in this direction and the older children almost as much as adults.

We are no longer satisfied merely to prevent disease. We want to build up and actively increase the vigor, wholesomeness, and happiness of the community. In this new and greater aim, it is even more important to have the coöperation of the children of the rising generation than that of the adult.

Acknowledgment is due to Dr. B. E. Roberts, formerly Assistant Surgeon, United States Public Health Service, for his valuable assistance in the preparation of the revised edition.

CONTENTS

ILLUSTRATIONS

Courtesy W. H. Manning, Boston

Courtesy W. H. Manning, Boston

Courtesy Town Room, Boston

HOW TO RECOGNIZE A WELL-KEPT CITY

Good pavements, good sidewalks, beautiful trees, gardens on vacant lots, a wading-pool and a park where children can play, show a healthful community.

COMMUNITY HYGIENE

SECTION I — INTRODUCTION

CHAPTER I

THE MEANING OF HEALTH

The naturalness of health. It is the most natural thing in the world to be healthy, and the easiest and pleasantest when you know how. In fact, one of the surest ways to be happy is to keep yourself and everybody around you healthy. To be healthy means simply to be clean, wholesome, and strong, able to do your share of the world's work cheerfully and well, and to lend a hand to others when you have a chance.

Not only will health go far toward making you happy, but it is also your duty to keep yourself in health — the athletes call it "keeping fit" — fit for work, fit for play, fit for duty and helpfulness, so that you will always be able to carry your share and never be a burden to your family or to the community. It is really wrong to let yourself become sick or out of health when you can avoid it.

There is nothing mysterious or hard to understand about health. It means being in such good condition that you are ready to meet anything that happens and conquer it. If you are well, you will

not only be able to do the ordinary, everyday, easy things well and promptly, but you will enjoy fighting and conquering cold weather, disease germs, and exposure of all sorts. The very things which make you uncomfortable and wretched if you are feeble or sickly, will invigorate you, warm your blood, and give you the joy of conquering them if you are strong and well.

The secret of health is to get the better of your surroundings and be master of your circumstances. The secret of ill health is to let them get the better of you. To be healthy, you must care for yourself as a good farmer does for his workhorses, or as a skillful engineer does for his engine. You must be well fed, well exercised, well rested, and well ventilated. It takes a great deal of work — either your own or your father's — to earn your food, house rent, and clothing, and to keep you strong and healthy; but when you learn to keep yourself well and take pride in doing so, it becomes one of the greatest pleasures in life.

If you are healthy and well fed and work under healthy conditions, work is not a punishment, but an enjoyment. At first it may seem too much trouble to keep yourself spotlessly clean; to keep your hands washed, your hair parted, your teeth brushed, and your nails trimmed. But you feel so much better after you have done these things, and you thus avoid so much illness and discomfort, that they soon become second nature. You feel positively

unhappy and uncomfortable if you have lost your toothbrush, or can't have clean water to wash in, or must go without your bath.

Health and happiness are first cousins. Many people think that it is a tiresome, melancholy, depressing thing to be thinking always about your health, to be afraid of catching diseases, refusing to eat this, forbidden to drink that, and living in constant fear that some disease may fasten itself upon you. So it may be, if you go about it in the wrong way. The fact is, however, that at least two thirds of the things you must do to keep yourself in health are things that you already like to do. You enjoy eating plenty of wholesome, nourishing, well-cooked food. You like plenty of play and exercise in the open air. You want to sleep ten hours every night in a warm, comfortable bed, in a pretty, well-lighted room with the windows wide open. You prefer to wear plain, light, comfortable clothing.

Almost the only things that seem really difficult are keeping your hands respectably clean, especially at meal times; keeping everything out of your mouth except food, drink, and a toothbrush; keeping away from dirty or unwholesome things like undrained marshes, street mud, and the mouths of sewers; and having the windows open at the top in cold weather.

If you keep doing vigorously and happily those things which make you well and strong, you won't need to worry much about the danger of becoming sick. Indeed, you won't have much time to spend

in worry. It is a good thing to know enough about diseases to know how to avoid them; but if you will keep yourself well fed, well exercised, well rested, perfectly clean, and do not touch or come in contact with people who are sick, — unless they actually need your help, — you will avoid most of the risks that can be avoided. Keep the germs away from you, and just what their special names are need not bother you. All germs are alike so long as they have not crept inside your skin, or so long as you are strong enough to kill them if they start a small colony in your body.

The money value of health. While we know that we cannot enjoy life or be of much use to others when we are out of health, we hardly realize what an exceedingly important and valuable thing health is to the whole community. We often speak of the great value of machinery, looms, mills, and factories. We marvel at the strength of engines — the wonderful weights they can lift and loads they can haul. Yet we seldom stop to think that the most wonderful and valuable "steam power" of all is the strength and skill of human bodies and brains.

We boast of the wealth of our nation, of our rich and fertile farmlands, of our herds of cattle and flocks of sheep, of our splendid houses, factories, and shops, of our railroads with their thousands of engines and millions of cars and huge roundhouses and handsome stations, and the immense sums of money which all of these bring in every year. But

we forget that human labor earns more money for the nation every year than all these sources of wealth put together. The United States has more money invested in the health of men, women, and children — will lose more by their sickness or weakness and gain more by their health and vigor — than in all of its other possessions put together. As a wise man expressed it years ago, "National health is national wealth."

When a factory is burned down, or the boiler of an engine explodes and tears it to pieces, or two locomotives crash together and are smashed into scrap iron, we can easily see that the owners, and through them the community, have lost a great deal of money. But until recently we did not see so readily that the community also suffers a heavy money loss if a man, woman, or child dies, ten or twenty years before the natural end of life, of some disease which might have been prevented. This does not include the grief and the suffering which falls upon the family and friends. One is just as serious and genuine a loss as the other. It has been carefully calculated that every human life has a money value to the community, beginning with a newborn baby at three hundred dollars, and rising to a full-grown man or woman at six thousand dollars. It is encouraging to see that the value of human life is rising steadily. Thirty years ago it was estimated at only two thousand dollars for a full-grown man.

The community is now taking up seriously the question of disease prevention and the increase of health and vigor. Already it feels justified in spending large sums of money to secure the conditions which produce health, working power, and happiness. Every year scores of new laws are passed by the different state legislatures and by Congress to secure pure and wholesome foods in shops and markets, to see that milk from our dairies is clean and wholesome, to bring an abundance of pure water to our cities and towns, sometimes from fifty or a hundred miles away in the mountains.

The State has recognized that it is not only our business and our duty to keep healthy ourselves, but it is also our business to see that all others in the community, particularly children and women, shall be given a fair chance to keep themselves healthy and vigorous and happy. To permit anything else would be to allow a waste and destruction of our most valuable natural resources, which are far more important than mines or forests or water power.

For instance, laws have been passed to compel all factories and shops and work-places to be kept clean and wholesome and well lighted and well ventilated; to install guards over dangerous machinery; to prevent workers — particularly women and children — from working for such long hours as to injure their health; to provide lunch-rooms, rest-rooms, and toilet-rooms; and even to have doctors

A LESSON IN MOTHERCRAFT

and nurses in attendance to treat accidents and illnesses which occur. Funds are provided for workers who become ill, and, if they are killed, to support and educate their families and children.

This wonderful work is called Community Hygiene. Even now we are approaching the point where, by taking intelligent care of ourselves and doing what we can to help others, we are able to prevent at least half of the ordinary diseases and ill health. When we are properly organized, we shall probably prevent three fourths of the sickness and early deaths which now occur. Think what that will mean for the welfare and happiness of the community! As one probable result, we shall almost get rid of poverty. One of the ablest commissions that ever investigated the causes of poverty reported some years ago that in its judgment nearly two thirds of the poverty in the country was due to disease and ill health.

Then, let us keep ourselves healthy and do all that we can to help others to do the same. Let us get all the help and information we can which will teach us how to keep well and help others to keep well. By doing this, we shall make this world a comfortable and happy place in which to live.

CHAPTER II

CAUSES OF HEALTH

The prevalence of health. The causes of health are the causes of life — sunshine, food, air, and water. These are what the ancient Greeks called the four elements out of which the earth was made — fire, earth, air, and water. If we have plenty of fresh air and sunshine, plenty of good wholesome food, plenty of clean water to drink, and a fire to keep us warm in winter, we are more than likely to be healthy practically all of the time. Like the magicians of old, who claimed that they could call spirits from the vasty deep, the earth, and the clouds to aid them, we can call all the forces of nature — the sun, the wind, the rain, and the brown earth — to help us keep healthy. The science which tells us how to do this is called Hygiene.

In other words, health is a common thing, depending upon common things. The individual who is well fed, well exercised, well rested, and well warmed, is healthy. The city that is clean, sunny, and has plenty of open spaces for grass to grow and children to play, is healthy. The individual who lets himself be dirty, eats bad food, drinks impure water, breathes stale air, and works too hard without rest or play, becomes sick and makes others sick. The

city with dirty streets, bad water-supply, crowded houses, insanitary markets and bakeshops, and smoke-filled air that shuts out the sun, will have a high rate of sickness and death. Health is just a matter of common sense applied to the common things of everyday life.

We do not realize how common health is. So much disturbance is made about sickness, suffering, and death that we sometimes fancy disease is even more common than health. That is not true.

A hundred years ago — indeed, even fifty — there was some excuse for such a mistaken idea. Science had not then taken charge of human affairs. Dirt was not known to be dangerous; and nobody thought it had any connection with disease. People in Europe and in this country did not know how to take care of their bodies, and did not know that many diseases could be prevented merely by keeping themselves, their food, water, and homes clean. Because they did not know, thousands of them died from diseases which we now know how to prevent, and the average length of life was only twenty years.

To-day we know better. Any modern community would be ashamed to have the number of cases of disease that was common in the best communities fifty or a hundred years ago. The broom and the scrubbing-brush, the meat and vegetable inspector, the city chemist who makes sure that the city water-supply is pure, the garbage-collector, and the street-

HOW OUR STREETS ARE KEPT CLEAN

cleaner — these are some of the civic agencies which have made our communities wholesome places in which to live. To-day we live on an average nearly fifty-one years, chiefly because we know how to be clean. In India and China, where people have not learned how to take care of their bodies and homes, the average life is still about twenty years.

It has been found in schools and factories that the number of days lost from sickness by each of us is about fifteen in a year, which means that we are healthy over twenty days for each day on which we are sick. That is a fairly good average; but some day we are going to do even better. We are learning more and more all the time about how to keep ourselves well.

How the Canal Zone was cleaned. What the community can do to make its citizens keep well was shown when the Panama Canal was built.

The Canal was cut through the deadliest fever swamp in the world. It was considered that Panama had the most unhealthy climate known, except perhaps some parts of Africa. Every tropical infection known — malaria, yellow fever, the Black Death, cholera, and smallpox — could be found in Panama. In 1881 the French Panama Company attempted to dig the Canal, and lost more than one tenth of its working force every year, or half of its men in five years. Conditions were very bad indeed — so bad that some people thought the Canal could never be built at all.

Finally the French Company broke down and gave up the task and the United States undertook it.

General Gorgas, head of the Panama Canal Health Commission, took hold of the health problem.

One of the first things he did was to ask the United States Government to buy large quantities of the best and purest food to be found anywhere in this country. Beef was bought by the ton, flour by the carload, sugar by the thousand pounds, potatoes and fresh vegetables by the shipload. All these foods were shipped down to Panama to feed the engineers and laborers. At first the Government built restaurants and hotels and boarding-houses, because the workers, thinking they were coming to the most unhealthful country in the world, had not brought their families with them. After a time, when they found their health was so carefully protected, they sent for their families. Then the Government provided markets and shops where good food was sold at cost, and nowhere in the civilized world could food of the best quality be found at so low a price as in the Panama Canal Zone during the five years of the construction. This settled the clean food question, and laid the foundation for the rest of the health work.

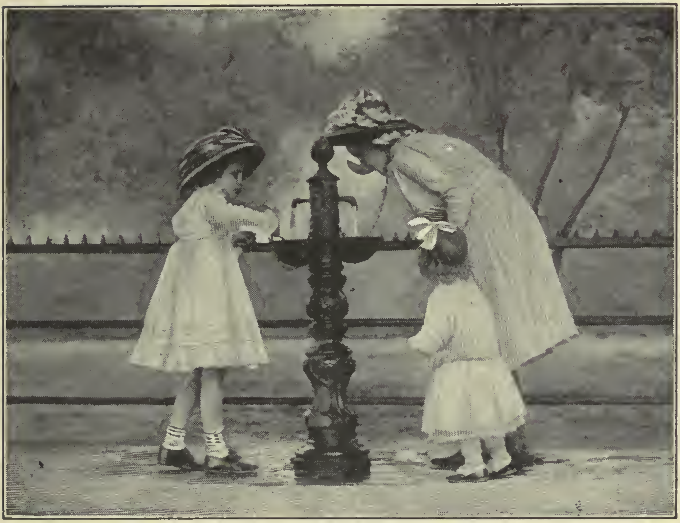
Putting in a pure water-supply. The next step that General Gorgas took was to stop the people from getting drinking-water from dirty or infected pools, sluggish streams, and stagnant swamps. He filled up all the shallow wells, because most of them

were infected with typhoid fever. He supplied every construction camp and working village along the line of the Canal with pure filtered water, cooled with absolutely pure artificial ice.

This immediately stopped the typhoid fever, dysentery, and cholera which had caused thousands of deaths under the management of the French Company. At the same time he provided proper drains and sewers so that all the waste from the houses and shops was carried away and discharged into the rivers or the sea, where it could do no harm and could not infect the drinking-water. That was the second step in the health campaign. Those against malaria and yellow fever will be described in the next chapter.

What happened to the death-rate. None of these steps which General Gorgas took sound exciting or unusual. Pure food, pure water, proper drainage — everybody knows about these things. In fact, they are only the very same steps which every town, city, and village in the United States has known for the last twenty years that it ought to take if it is going to be a wholesome place in which to live.

What was the result? The death-rate in Panama in the old days before our Health Commission took charge had been from three to five times as great as that in the United States or Europe. The greater part of this frightful death-rate was caused by malaria, yellow fever, cholera, and typhoid, all of which diseases are especially bad in hot climates. The



A WAY-STATION FOR GERMS

The public drinking-cup is one of the busiest spreaders of disease germs known. If the big girl has a cold, what will happen to the baby if she drinks from the same cup? What if the big girl is coming down with scarlet fever?

most striking thing which General Gorgas did was practically to wipe out all these diseases, partly by installing the pure water-supply, and partly by methods which we shall describe in the next chapter. He not only brought the death-rate to the same level as that of the United States (about fifteen deaths to every one thousand persons), but in the last three years of the Canal construction he made the Canal Zone the healthiest place in the civilized world, with a death-rate of five to six per thousand, or scarcely one third that of the United States.[1]

[1] It is only fair to say, however, that there was a much larger proportion of grown men and a smaller proportion of women and children

Contrast this with the conditions under the French Company, in 1881, when a death-rate of seventy-five to one hundred persons per thousand prevailed, and you will realize the result of keeping a community clean. It also shows how recent a thing is our knowledge of how to protect our health.

Why Panama is a lesson to our communities. If General Gorgas could do what he did in the unhealthiest climate in the world, in a community which contained a large percentage of uneducated laborers, and with no civic improvements or civic pride to help him, what cannot intelligent American towns and cities do if they will only use their own good common sense to wipe out those things which cause disease and to increase those things which cause health? Our climate is naturally healthful, our homes are good, our citizens are intelligent and public-spirited. We can get pure water at comparatively little cost, and good clean food without having to send it three thousand miles in refrigerator ships. We ought to be the healthiest nation in the world; and if we will only do all that we know how to do and can do to keep ourselves well and help other people to do likewise, we can be much more healthy and happy than we are to-day.

in Panama than in the United States, which would mean a smaller number of deaths, because more deaths occur during the first ten years of life than during any other period.

CHAPTER III

ENEMIES TO HEALTH

Rocks in the life-stream. Much of our health knowledge is very old. We did not need, for instance, to wait for the discovery of the microscope or the invention of the steam engine to know that if people did not have enough food to eat, or ate spoiled food, they would become sick. In fact, we usually know by instinct what to do to keep well. We eat when we are hungry, drink when we are thirsty, and dislike muddy water in our glasses or dirty food on our plates. We dislike the taste of most poisonous things, without needing to be told that they are bad for us. We dislike the hot, burning taste of alcohol, for instance, when we first try it. People who use it must teach themselves to like it, or even to swallow the wretched stuff without gasping and making a face.

Dangers which we do not know. Although we know by instinct a great many of the things which are bad for our health, there are other kinds of danger which we cannot understand unless we are told about them. These dangers have been discovered only in the last thirty or forty years, since the microscope came into use. They are the great diseases which run through a country, an army, or

a town; and which are now called *infections* because they are "catching" and spread from one person to another "by touch." Sometimes they are called *contagions* from two Latin words which mean *by touch*, or *spread by touch*. Both these words mean that you catch the disease because something from the body or breath of a sick person has come in contact with your body.

Most of these infections are fevers. When we have caught a fever infection, our bodies become hot, our faces turn red, our heads ache, and we say we feel "as if we were burning up." When a fever thermometer is slipped under our tongues, we find that our body heat, or temperature, has gone up from 98.6 to 100, 102, or even 105 degrees. It is no wonder we feel as if we were burning up, for we know that when the thermometer rises to 102 degrees in the shade we think it is a very hot day.

Although these fevers or infections are troublesome, and some of them are extremely dangerous, they usually "run their course" and come to an end of their own accord. They may make us feel very sick while they last, but we know that almost always the fever will "break" in a few days, the headache and backache disappear, we will feel much better, and will soon be well.

For a long time people were greatly puzzled over the reason why these fevers behaved in this curious way. All of them, except the very worst, broke and began to improve sooner or later. Stranger still,

each particular fever or infection took a certain length of time to run its course, varying from three or four days for a common cold to three weeks for typhoid fever.

Some fevers were even more peculiar; for while they ran for several weeks, or even months, they kept the patient sick only about half or a third of the time. These were the malarial fevers or agues — or, as they were sometimes called, "chills-and-fever," or "fever-and-ague." In some of these the patient one day was exceedingly ill and wretched, with a very high temperature and shaking until his teeth chattered. The next day he was practically well and able to go to work. The following day he came down with another chill and fever. This succession of fever and normal condition continued for weeks. The patient could tell with absolute certainty that on, say, Tuesday and Thursday and Saturday of next week, or the week after next, he would be very ill, and on Monday and Wednesday and Friday practically well. Some other kinds of malaria have a three-step instead of a two-step gait, making a patient sick one day, well two days, then sick again, then two days well. Still another has the habit of making the patient sick only two or three days out of the week, but gives him no idea in advance what days they will be.

How we discovered the germ. This singular way the infections had of following their own peculiar course gave rise many centuries ago to the notion

that they were due to some kind of tiny plant or insect or worm which had made its way into the human body and was living its own life there. About fifty or sixty years ago we succeeded for the first time in making microscopes powerful enough to make such tiny objects visible. As soon as a drop of blood or saliva or other fluids from the body of a patient sick with these curious "living fevers" was placed under the microscope, we found that it was swarming with thousands of these tiny creatures. At first it was supposed that they were very small animals, but it was soon found that most of them were tiny plants, more like moulds and the fine, dusty powder in puff-balls than anything else. As these plants had never been seen before, they had no name; and they were christened *germs*, from a Latin word meaning seeds or sprouts.

As one disease after another was studied, it was found that each of these infectious fevers was due to a special kind of germ; that the length of time it took for the fever to get to its height was simply due to the length of time its germ needed to grow to its full size and numbers in the human body; and that the breaking and fall of the fever was due to the weakening and death of the germs under the attack of the cells and fluids of the body.

The same microscope which enabled us to see the germs also showed us that every part of our bodies was made up of an enormous number of tiny *cells*. In fact, our body cells and the germs which attack

them are much alike, only our body cells are from twenty to fifty times as big as the germs, and are animals, while most of the germs, as we have seen, are vegetables or plants. Another difference is that our body cells are tied together and packed closely side by side, like bricks in a house, or popcorn in a ball, while the germs are all separate and distinct from one another. Like fish in the sea, they swim about freely in all directions, in the blood or other fluids of the body.

The battle between the cells and the germs is usually all in our favor. The germs may be counted by thousands, or often by millions; but our body cells are numbered by billions, are far bigger and stronger, and have been trained for at least two or three thousand years to live on vegetables and eat germs of all sorts. Not only does the body destroy the disease germs which cause illness nineteen times out of every twenty, but it is almost certain that at least four out of five times that disease germs get into the body, the body destroys them before they have time to grow sufficiently numerous to cause an attack of the disease at all. In fact, even if we are exposed to the disease, we must either receive a very large dose of the germs, or be in a weakened and run-down condition in order to "catch it," as we say.

How we avoid infections. Now that we know that each one of these infections, from a cold in the head to consumption, and from chicken-pox to cholera,

is caused by a particular germ, and that this germ can come only from the body of some one who has that disease, it becomes a matter of common sense to try in every possible way to prevent the carrying of these germs from sick persons to well persons. Find out how the germs travel from one body to another and break the connection, and it will not be long before we shall get rid of these infectious diseases entirely.

This power to break the connection between germs in the bodies of those who are sick and the bodies of those who are well has given us our greatest weapon for preventing disease and protecting health. In the previous chapter, we saw how General Gorgas gave the people of the Canal Zone clean food, good drainage, and pure water. That did a great deal to stop sickness. Some diseases, such as cholera, typhoid, and dysentery, were carried chiefly through the water of streams or wells, which had been infected with the discharges from the bodies of patients suffering from cholera, or typhoid, or dysentery, and then was used for drinking water by others. Giving everybody plenty of pure water to drink and preventing them from drinking infected water stopped at once these three most deadly diseases.

However, cleanliness alone was not enough to stop all the kinds of sickness, because the two deadliest diseases at Panama were not carried directly from the body of one patient to that of another.

Malaria and yellow fever were carried by a certain kind of mosquito which sucked up the disease from the blood of a fever patient and later, in biting a well person, infected him with the disease.

Clearly enough, the thing to do in this case was to destroy the mosquitoes, or to prevent them from biting the sick and becoming infected with the disease, to infect, in turn, those who were well. This was done by draining the swamps where the mosquitoes breed, screening all windows and doors of hospitals so that no mosquitoes could get at the sick people, and making the well employees live and sleep in houses which had been carefully screened.

These three things were done so thoroughly that within two years General Gorgas was able to offer a reward of one hundred dollars for the discovery, in any hospital, house, hotel, or building in the Canal Zone, of a mosquito capable of carrying malaria or yellow fever. As a result of his campaign, these two dreaded diseases, which had formerly caused three fourths of all the deaths, practically disappeared.

But there were two other serious diseases, pneumonia (lung fever) and tuberculosis (consumption), which presented a different problem. They were due to germs; but these germs could not pass from one body to another except when the sick and the well were crowded together in barracks or badly ventilated rooms. The houses were so well built and ventilated, and every one coming in was so

carefully examined for consumption, that the germs of consumption were never allowed to get a start in the Canal Zone. The germs of pneumonia, however, have a curious habit of living on for months, and even years, in the mouths of those who have recovered from the disease, without producing the slightest effects upon their health. Many of the white men employed were carrying about pneumonia germs in their mouths and throats. Much of the heavy labor on the Canal was done by negroes from the West Indies, and many of these had never been exposed to the disease. Therefore, when they lived or worked near the white men who were carrying the germs, they became violently ill. Being for the most part single men, or having left their families behind at home, they were housed in rather large and somewhat crowded barracks. The disease spread among them at a fearful rate and caused a great many deaths during the first year or two. This, however, was soon stopped by encouraging the married men to send for their families and establishing them in well-built and well-screened cottages of their own. The unmarried men were distributed by twos and threes to board in these cottages. If a new man caught the disease, it did not spread because those in the cottage with him, having been there a year or more, had already been exposed to it; and the pneumonia death-rate dropped to nearly as low a figure as that of Northern cities.

You can see, then, that our health and that of

WHERE CITY CHILDREN GROW STRONG

our communities, depends (1) on our natural knowledge of the things that are good for us, such as fresh air, sunshine, clean food, pure water, and wholesome work and play; (2) on our doing the things that we know will increase health and decrease disease, such as keeping our homes and our cities clean and wholesome; and (3) in preventing the spread of disease from one person to another, which is accomplished partly by cleanliness, and partly by keeping well people — except doctors and nurses — away from people who have been so unfortunate as to catch an infectious disease.

SECTION II—HEALTH IN THE HOME

CHAPTER IV

THE KITCHEN

"The heart of the kitchen" — the stove. From a health point of view, the kitchen is the most important room in the house. It ought to be one of the most attractive — and indeed it is on baking days, as your nose will tell you. It should be one of the brightest, pleasantest, best ventilated, and absolutely the cleanest place in the house. Indeed, the picture made by its well-blacked stove with bright nickel trimmings, its snowy-topped table under the white-curtained window, its spotless floor, its glittering show of bright tins and blue-and-white china, its well-stocked pantry which smells of good things to eat, and its cabinet with shelves of fascinating glasses and jars, is much more attractive than the stiff front parlor. It is no mere accident that you find in the great picture galleries at least two or three times as many paintings of kitchens as of best parlors.

The kitchen should be an attractive room, for here it is that our food is made interesting. Raw food is just as nourishing as cooked food. Some of it tastes fairly appetizing — for example, apples and celery — but most of it has to be cooked before we

like to eat it. Fancy sitting down to a meal of raw beef, raw potatoes, and dry corn-meal! The kitchen is the cooking place, and the stove should occupy the position of honor.

Instead of being set away in a corner, wherever the chimney and flue may be most conveniently put, it should be placed in the center of the longest wall in the room, and stand well out in the middle of the floor so that it will be only a few steps from it to anything else in the room. The oven door should face the window so that the cook may have a good light to see how the bread or roast is cooking. The sink should be at one side, not more than six or eight feet away, so that dishes and hot water may be quickly lifted backward and forward; and the table should be on the other side within easy reach, so that dishes which are to be cooked can be easily lifted from it to the stove or oven. The cabinet should stand directly over, or close beside, the table. Its shelves and drawers and swinging boxes for cooking materials should be so arranged that they can be reached by the cook as she sits at the table, without rising or inconvenient reaching.

Why and how we cook. If you were asked why we cook our food, you would probably say at once, "Because it tastes better." That is true, although it is only another way of saying that for thousands of years we have found cooked food agrees with us better, and so we have come to like the taste of it. Cooking makes food easier to digest, easier to chew

Courtesy Mass. S.P.C.C.

EVERYTHING WRONG IN A KITCHEN

Dirt, unwholesomeness, bad ventilation, disorder, and lack of self-respect are plainly shown in the kitchen of this family. One would rather go hungry than eat a meal cooked here.

or grind into a pulp, and kills any germs which may be in it. In some cases it will even destroy the poisons of germs, or other poisons, which may be in the food.

Cooked food is not only much pleasanter, but also much more wholesome than uncooked food. It does n't make much difference whether the heat is applied through boiling water, as in stewing or boiling; or through the walls of an oven, as in baking; or directly to the food, as in broiling or frying,

EVERYTHING RIGHT IN A KITCHEN

Cleanliness, light, air, order, and convenience of arrangement are shown in this kitchen. Notice the hood over the stove, the open plumbing, the washable walls, and the open window.

or toasting over the fire. If foods, such as vegetables or fruits, contain a great deal of moisture and we like to eat them moist, it is more convenient to boil or stew them. If we want to keep the juice and the water in our meat, we stew it with the vegetables; but if we want to bring out the real flavor of the meat, we broil or roast it. There is little saving in boiling meat because nearly all the weight lost in roasting or frying is water, which has no nutritive value; and as boiling takes a longer time than fry-

ing or roasting, the extra cost of fuel more than balances the accidental waste caused by burning or cooking too hard on the edges.

Our home sterilizer, the sink. Next after seeing that the food is perfectly fresh and sweet when it comes and is kept scrupulously clean in a cool place until it is eaten, the most important care in a kitchen should be to keep all the pots, pans, and dishes in which food is cooked or served absolutely clean and sterile, or free from germs. If pots and pans are not carefully scrubbed and scoured, or if dishes are not thoroughly cleaned after use, the scraps of food which stick to them quickly begin to decay and will infect the next food which is placed in them. The best way to clean pans and dishes is first to scrape them with a dull knife, then to wash them or scrub them with a mop or brush in hot water to which has been added some soap or soda or other form of alkali, which has the power of dissolving or "cutting" the grease. This first wash-water has all the dirt which was on the plates and dishes still dissolved in it, and when they are taken out there is still a thin film of grease over them. Now rinse them off by pouring hot water over them, or, better yet, while they are still warm, use a wire basket with a handle and dip them for a minute in clean boiling water. This not only makes them perfectly clean and sterile, but also saves a great deal of trouble in drying them. If the dishes are placed in a wire or wooden basket or rack, the last

scalding rinsing leaves them so hot that they will almost dry by their own heat, and your dish-towel keeps clean and free from grease. It does not make much difference whether soap or soda or some one of the various washing-powders and cleansers is used in washing the dishes; only do not use any which are strong enough to "eat" the skin of your hands. Soap hurts the hands least. It is better to use a long-handled dish-mop so as to keep the hands entirely out of the first water, or to use rubber gloves when handling the glasses and silver. Any soaps or alkalies that are strong enough to dissolve the heavy grease on the dishes will irritate the skin of the hands, making it rough and chapped. Even very hot water, such as ought to be used for dish-water, has the same effect.

It is not a mere matter of personal vanity to try to keep your hands smooth; it is a matter of cleanliness. When your hands are rough and cracked, it is almost impossible to keep them perfectly clean, for dirt and germs will work into the cracks and stay there. Before each surgical operation, surgeons used to scrub their hands in six or seven different waters with strong germicides and soaps. They found, however, that after a few months this made the skin of their hands so rough and cracked that even after the most careful scrubbing germs were still on them when laboratory tests were made. They therefore gave up the scrubbings and scaldings, used milder soaps, and wore rubber gloves.

If the skin of the hands is perfectly smooth and supple, it will shed germs and can be cleaned easily.

Cleanliness in the kitchen. The kitchen ought to be kept almost as scrupulously clean and white as the surgery or operating-room in a hospital, because infection in the one place may be almost as dangerous to health as in the other. Not a particle of food, waste, trimmings, or scraps should be left about to decay. The floor ought to be of hard wood. Some modern kitchens have floors of cement or colored tiles. Sometimes the floor may be covered with linoleum or heavy oilcloth. Whatever is used, it should be a material easily washed and kept clean. The walls should be well painted, with a glossy, hard finish, so that they can easily be wiped down with a damp cloth. A kitchen should be a corner room with windows in two sides of it, so that the heat of cooking and the odors of boiling cabbage or frying meat can be quickly carried away. It is also well to have a hood of sheet-iron or tin above the stove, opening into the chimney higher up, so that heat and cooking odors can be carried out by the chimney without scenting the whole house. No food should be kept in the kitchen itself, because the heat is almost certain to spoil it or cause it to give off unpleasant odors. Food should be kept in a closed pantry with outside windows, or in an ice-box or refrigerator.

Light, air, and temperature in the kitchen. It is important to have windows in two sides of the

kitchen for another reason besides ventilation and coolness. There should be light upon both sides of the stove, table, sink, and every corner of the room. Light is the best germicide and purifier known. Also, it is impossible to keep any place or corner clean unless there is plenty of light in it to show the dirt. Dark places always become dirty places sooner or later. While most women take pride in keeping every corner of the kitchen clean, some cooks are lazy and will not only leave dirt and dust lying untouched in a dark corner, but will actually brush more into it, just to get it out of the way. There ought not to be any place in the kitchen in which dirt or dish-rags or floor-cloths or scrubbing-brushes can be hidden.

Another reason for plenty of light and air in the kitchen is that there should be plenty of room to dry and ventilate the half-dozen or more dish-cloths and towels which should be scalded clean and dried every day. A dark, stuffy, ill-ventilated kitchen is a lurking place for dirt and germs. Sooner or later, they are sure to get into the food and cause trouble in our stomachs.

Why a cook may look at a king. Some of the most important and useful work in the world is done in the kitchen. It calls for a high degree of skill, intelligence, and care to do it wholesomely. It is as much a work of art to cook a good dinner or plan out a wholesome menu as it is to paint a picture or write a poem, and infinitely more useful and better

A SIMPLE BUT ATTRACTIVE DINING-ROOM

Plenty of sun and fresh air, washable covers on the chairs, light draperies at the windows, and a rug that can be taken out and swept — these are all excellent things to have in the room where we eat.

worth doing. Cookery is one of the highest arts, and should be regarded as one of the most honorable and dignified occupations in the world. There are few people who are such useful members of society as really good cooks.

CHAPTER V

THE PANTRY, THE ICE-BOX, AND THE MILK-HOUSE

How to keep food sweet. Most foods are changeable stuffs. They don't "keep" well. Vegetables and fruits lose water, wilt, and become unfit to eat. Flour and corn meal turn sour and moldy. Potatoes decay and sprout. Some foods, like milk, turn sour; or, like meat and eggs, become tainted; or, like butter, grow rancid. We can never avoid this risk in foods, no matter how carefully we may keep them, because this changeable condition is one of the things which make them fit for food. A food must be not merely a fuel, it must be a fuel in such a changeable form that it can be readily broken up and burned in the body. Fuels which keep extremely well are usually of little or no use in our bodies. Coal and wood and oil, for instance, are excellent fuels in a stove, but we could n't make a satisfying meal on them. We must, therefore, eat our foods as quickly as possible after they come from the farm or the garden, or we must keep them in places that will prevent as long as possible their undergoing these changes.

Dry foods and their storage. Some foods, like flour, corn meal, rice, and sugar, need only to be

kept dry and free from dust or dirt. They can easily be kept in boxes or bins or cans with tight-fitting tops. The main danger is that molds may get into them and cause them to spoil. Some of the changes which make foods unfit to eat come from the nature and structure of the foods themselves, and the easily changing form of them. But most of them, and all the serious ones, are caused by the growth in foods of certain germs or molds. Molds and yeasts are the commonest of these, because, unlike the disease germs, they give off tiny seeds or spores, which are so light that they float readily in the air, like grains of dust in a sunbeam. Almost all the air of rooms or houses, especially where foods have been stored or served, contains these floating spores of molds and yeasts. If food is left exposed to the air, these spores will sow themselves on it, and soon will grow a coat of blue, or gray, or whitish mold over its surface. Or, if it be moist and contain sugar, the yeast spores will fall into it, and it will begin to ferment. All boxes or cupboards or cans in which dry foods of any sort, particularly flour or bread or cake, have been kept, should be cleaned out very thoroughly at regular intervals and either scalded with boiling water or baked on the top of the stove to kill the germs. Better still, put them out in the sun where the sunlight can kill the germs.

Moist foods and their care. Moist foods cause much more trouble. First, because ordinary drying

or wilting tends to spoil them; and second, because germs grow much faster upon wet surfaces, or upon moist substances, than they do on dry ones. The best thing that can be done with moist foods, like milk or meats or fruits or fresh vegetables, is to put them in a cold place. In winter you may put them near an open window, or just outside it in a box covered with wire mesh. In warm weather, an ice-box is necessary. The cold keeps the food sweet by preventing the germs from growing. Unfortunately, however, there are some germs, like certain kinds of molds, which will grow even in a cold temperature. For this reason all the food should be taken out of the ice-box at least once a week, the shelves lifted out, and the inside of the box thoroughly scrubbed and scalded. If possible the shelves and the box itself should be put where the sun can shine into it for a while, or the ice-box will soon begin to smell sour from the growth of these molds. If it is not kept clean, food left in it for more than a day or so will become moldy.

Milk and the crops it grows. Of all the moist foods, milk is the one which changes most rapidly. This is partly because it is almost as attractive to the germs as it is to us, and partly because it is in an easily changeable condition. Several germs will grow in it which can scarcely establish themselves in anything else.

As every one knows, milk, after a short time, turns sour. This is due to its infection with the germ

known as the *lactic acid bacillus*, which floats about through the air. *Lactic* is simply the Latin word for *milky*, and *lactic acid bacillus* means the *milk sour germ*. The acid produced by this germ curdles or "clabbers" the milk. After it has been curdled for some days, it begins to turn putrid. This is usually due to various dirt germs from the cow-barn, the milk-house where it was kept, or from the dust of the street, if it was ladled out of cans in the milk-wagon.

How to keep milk sweet. Milk as it comes from the cow is usually perfectly pure and wholesome. If pains are taken to keep it free from germs, it will keep sweet and fresh in a cool place, not merely for one or two days, but even for ten days or two weeks. This, however, is impossible unless the barn or shed where the cows are milked is kept clean and free from dust, and is floored with cement or some other waterproof material which can be washed down with the hose. The milkers must wash their hands carefully before they begin to milk, and must put on clean cotton caps and jackets. The milk must be cooled and put at once into bottles with close-fitting tops. As most city milk is from twenty-four to sixty hours old before it reaches the consumer, it is most important that all germs should be kept out of it; otherwise, in this length of time they would have grown to such enormous numbers that the milk would be unwholesome to drink.

In the country, and in villages or small towns,

where the milk can be used within ten or fifteen hours after milking, it may not become so unwholesome even if a little of this barn dirts gets into it, because the germs have not had time to increase to such enormous numbers. But nobody likes the idea of drinking milk that is not clean. Besides, some of the milkers or handlers may have had typhoid fever and still may be carrying the germs of it in their bodies. Unless they are very careful to wash their hands, some of these germs may get into the milk. Scarlet fever may also be carried in the same way.

Our acid friend. In one sense, curiously enough, we hardly ought to regard the lactic acid or milk sour bacillus as an enemy, because if milk is carelessly handled so that it contains dirt germs, the acid produced by the lactic acid bacillus prevents these germs of putrefaction from developing for twelve or fifteen hours and sometimes for a day or two. Sour milk, though usually unpleasant to the taste, is not actually unwholesome, except for young babies or invalids. Many people in hot countries, like the Kaffirs of Central Africa, deliberately curdle their milk soon after it comes from the cow by putting a little sour milk into it. This turns it sour quickly, and prevents the development of the germs of decay.

Milk-pantries and milk-houses. After the milk has been carried in pails from the barn into the milk-house or spring-house or pantry, the most important thing to do is to keep it carefully protected from

dust or flies so that no more germs can possibly get into it. Also it must be kept as cool as possible, to check or prevent the growth of such germs as may already be in it. This is why the old-fashioned milk-house was often built over a spring, so that the milk-pans could stand in a trough full of the cool spring water which was kept flowing through it. If there was no spring, they were placed near a well and a pipe arranged so that water could be pumped into the troughs and changed frequently. These milk-houses or pantries should be kept spotlessly clean and so arranged that they can be thrown open once or twice a week for a thorough airing and sunning. All doors and windows should be carefully screened with the finest and closest wire mesh, so as to keep out not only flies and other larger insects, but dust and midges. If ice can be had, it is much better, of course, to shut the milk into an ice-box; but if cold water can be had in such quantity as to keep the temperature of the milk down to fifty-five degrees or lower, this will do very well.

The free-delivery fly. The busiest and most effective distributor of germs and dirt over our food is the ordinary house fly. All you have to do in summer time is to leave food where the flies can get at it, and you can count on its being infected within three minutes. The fly lives on food and he breeds in filth — manure heaps, garbage piles, and the like — and he keeps up a constant circulation between the two. If any garbage, offal, dirt, manure, or

Courtesy Mass. Society for the Prevention of Cruelty to Children

EVERYTHING WRONG WITH A MILK-HOUSE

The barn drains towards the milk-house, the manure heap is under the unscreened windows, the well is where all the barn dirt can seep into it, the milk-cans are open to flies and dirt. Worse than all, a family actually lived here until the board of health made them move.

other decaying substances are left within a hundred yards of your house, you can be sure that it will be found by the fly, and that he will carry samples of it back to your food. The best way to keep flies out of the pantry is to have no flies. Until that victory is won, and for fear your neighbors might not keep all their flies at home, it is safest to see that at least all the windows and doors in the kitchen, pantry, dining-room, and cellar are covered with well-fitting wire screens. Every screen that you put in the house will save at least one attack of stomach or bowel trouble for each member of the family.

Smells and their meaning. One of the best ways to tell whether a pantry is being kept properly clean and well ventilated, and whether the food is properly protected and cooled, is to go into it fresh from out of doors, sniff hard, and notice how it smells. If it smells cool, fresh, and clean, and if the only odors you can distinguish are those of the different kinds of foods, you may feel sure that everything is in good condition. Nature warns us against decaying and unwholesome foods by the unpleasant odors of most processes of fermentation and putrefaction. The fermentations caused by the yeast plant when stewed fruits or jam or bread turn sour generally have a pungent, sourish, vinegary smell. Those caused by molds and musts give off a mousy, musty odor. Those changes caused by the germs of putrefaction and ordinary dirt have a tainted, disagreeable smell, easy to recognize.

HOW THE CITY INSPECTS OUR MILK

The city milk inspector testing can-delivered milk as it comes into the city in the early morning, and the bottling room of a sanitary dairy.

CHAPTER VI

THE CELLAR

Cave dwellings of to-day. The old-fashioned cellar was a survival of the earliest house, which was a hole in the ground. The protection and warmth afforded to our ancestors by their cave dwellings were advantages which they could get in no other way. These advantages still exist, but modern methods of storage and heating make them much less important to us, and the disadvantages of the cellar's darkness, dampness, and mustiness far outweigh its good qualities. It may be easy to heat without much cost for fuel, but it is hard to light, harder to ventilate, and hardest of all to drain.

There are good reasons, however, for our continuing to dig cellars, in spite of their disadvantages. A well-heated and properly drained cellar helps to keep the floor of the house dry and warm. The best place for the furnace is in the cellar, and coal must be stored somewhere close by. Besides, the cellar is a convenient place to store tools, canned goods, and such household supplies as are not subject to decay or mold.

Why cellars are unwholesome. Up to twenty years ago, and even to-day in many rural com-

munities, the cellar was used to store the greater part of the family's winter food-supply, and many foods throughout the year. It was dark, damp, and musty. Like nearly all dark places, it was dirty. It was perfumed by the ghosts of ancient cabbages, decaying turnips, pickle barrels, and salt meat. Its moisture and darkness made it a breeding-ground for molds and yeasts of every description. Almost everything left in it, from fruits and vegetables to salt meat and milk, was likely to become coated with a greenish or grayish covering of mold, or soured by the fermenting growth of yeasts. The pickle barrels grew sourer little by little through the winter, the bins of vegetables gradually became more and more decayed, and milk, cream, or cheese was apt to sour very quickly in the contaminated air. By spring, the cellar was in a most insanitary and unwholesome condition, and the odors given off from it rose through the floor and up the stairway to scent the whole house.

Worse than that, it was damp. While the surface of the ground about the house might be sloped and graded for drainage, and perhaps might have a tile drain laid down, this drainage system was considerably above the floor of the cellar. Consequently, water collected, so that at times one had to balance one's uncertain way upon boards supported on boxes or buckets across the cellar floor to the food shelves. Living over a damp, stagnant place of this kind is bad for the health of the family.

Chilblains, colds, and various infections are likely to result, and the health average of the family is always lowered.

The flora and fauna of the cellar. Another of the serious disadvantages of the old-fashioned cellar was its animal and vegetable inhabitants. Not only were cellars a hothouse for molds, yeasts, and all sorts of bacteria, but they were havens of refuge for rats, mice, cockroaches, earwigs, beetles, and even small newts and salamanders. In the autumn, rats and mice swarmed into the cellar, and set up housekeeping. They ate what fruits and vegetables they could, scampered over and gnawed the rest at leisure, and enjoyed themselves thoroughly. They scratched holes in the dirt under the board floor and dragged fragments of food into dark corners, where they left them to decay. Not only did they waste ten times as much food as they ate, but they were a menace to public health. Rats carry bubonic plague. Both mice and rats are filthy in their habits and may carry germs from filth to our food. They are dirt-making, disease-spreading vermin, and the modern house and cellar should be built so that there is absolutely not a single nook or corner in which they can live, or through which they can penetrate into the house.

The change made by the furnace. Except in a few old houses, the coming of the furnace has changed this unwholesome condition of the cellar. Most modern cellars are built as basements, rising

at least two feet above the ground on their deepest side, and often being almost at ground level at their shallowest end. They are much easier to light, ventilate, and drain, and are far more wholesome.

The furnace has done another thing in the interests of health by making the cellar a poor place to store food. It has made the cellar so dry that most fruits and vegetables are apt to shrivel if kept too long in it, and has thereby broken the old custom of piling bushels of apples, potatoes, cabbages, turnips, and other vegetables into the cellar in the fall, to be eaten all through the winter as they gradually decay. It has also stopped the unwholesome custom of pickling in barrels, or dry-salting upon cellar shelves, of a considerable amount of the winter's beef and pork; and it has made the cellar the last place where the housewife tries to keep milk, cream, butter, and cheese.

How to store the family food-supply. As we have seen, the cellar is a poor place in which to store food products. Still, there are many foods which can be bought in quantity much more cheaply than by the quarter's-worth; and on the farm it is absolutely necessary to store the home-grown supply of vegetables, fruits, meat, and milk. What, then, should be done with it?

Where milk is handled in considerable quantities, a milk-house with water flowing through it should be provided. This is described on page 40. In

towns and cities, the only proper place to keep milk, cream, butter, and cheese is in the ice-box.

Where people are fortunate enough to grow their own fruit and vegetables, it is a good investment to build a special storehouse. This both protects the health of the family, and saves waste through decay. It may be in the form of a cave with the roof covered with earth and a provision for ventilation made at each end; or, better still, of rough lumber with thick double walls, the space between them being filled with dry sawdust or hay. Fruit and vegetables will stand a great deal of cold, provided the freezing or thawing is not too sudden. With the assistance of a small coal-oil stove, which can be lighted on the coldest nights, apples, potatoes, and other vegetables can be kept in far better condition in such a storehouse than in damp cellars.

Where the household cures its own meat, a small and comparatively inexpensive but tight and well-built shed or smokehouse should be used for this purpose, with good light and ventilation and screens over doors and windows. Properly cured and smoked meats are not hurt in the least by being frozen, and there is no reason why meat curing and meat storage should be carried on in the cellar. From the point of view of the family's health, there is every reason why they should not be permitted there.

In some cases, however, it may be necessary to use the cellar as a storehouse for foods, and if the

storage is properly managed, this may be done without serious danger to health.

The best method is to set off one particular room for the purpose. It should be well lighted, well drained, and may, if desired, have a double wall, filled with sawdust. By adjusting the openings of the well-screened windows, it can be kept cool in winter, even when the furnace is being operated. Apples, potatoes, celery, winter squashes, etc., can be kept in excellent condition if laid on racks or shelves in such a room. They should be piled only one layer deep, and kept in a good light, so that they can be watched constantly for signs of decay. Milk, butter, and cheese should not be kept in basement rooms, no matter how carefully arranged, on account of the extreme readiness with which they absorb odors and sprout any bacteria or molds which may be floating in the air. Neither should pickle barrels be allowed. Dry-salted meats, if kept on racks similar to those used for the vegetables, may be stored in the basement, and of course canned goods and preserved fruits, jellies, and jams hermetically sealed in glass jars can be kept in the basement without spoiling and without injuring the family health.

How the model cellar should be made. The model cellar or basement, as constructed by boards of health fighting the plague and other diseases, has cement walls, cement floors, and a broad strip of wire mesh buried in the cement around each

corner. The sills of the house are laid in cement with more strips of this wire mesh imbedded in the cement and spiked to the beams. The doors leading into the cellar and at the back of the house are made with carefully leveled cement or iron and steel sills, and protected with a strip of iron around the bottom, so that there is not the smallest chink through which either mouse or rat can squeeze or gnaw his way into the house.[1] It must, of course, be carefully drained by a tile laid all around the upper, or hill, side of it, at, or slightly below the level of its floor, so that no rain or ground water can get into it.

Such a cellar is ratproof, waterproof, dry, well lighted and ventilated. Every particle of its inner surface can be swept clean with the broom and scrubbed or washed down with the hose. It is not merely the best for keeping disease out, but also the best for keeping health in. People who live in a house with such a cellar will never have chilblains, which come from cold, damp, unventilated floors, and they will be much less likely to catch colds and other infections.

[1] The same methods protect a house entirely against cockroaches and beetles. If the windows and doors are made tight-fitting and protected with screens, there will be no flies, and very few germs of any sort.

CHAPTER VII

WASHING AND LAUNDERING

Eternal cleanliness the price of life. Nothing will keep tidy of itself. Everything that lives and grows and moves has a perpetual tendency to scatter waste, pile up dirt, and accumulate stains and smears. The moment you stop cleaning yourself or your house, the dirt begins to gather again. We must wage a constant struggle to keep clean.

This lifelong war of the scrubbing-brush sounds almost discouraging. Fortunately, after we have once formed the habit, it becomes second nature, and we come to enjoy it. We feel so much better, our houses are so much more pleasant and wholesome, that we take a real satisfaction in keeping clean.

Scrubbing the floors. Scrubbing the floor is perhaps one of the least attractive forms of cleaning. Yet many housewives positively enjoy scrubbing their kitchen floors, and take pride in a clean, white, shining surface underfoot. One of the most important things in planning for a new house is the flooring. All downstairs floors, and as many of the upstairs floors as possible, should be made waterproof and watertight. It should be perfectly easy to scrub them and to wipe them with a damp cloth or a mop

instead of sweeping them with a broom or brush. With floors of this character, it is much easier to keep the house looking clean and attractive.

Moreover, the floor is the chief settling-place for dust and germs which may be in the air. On the floor they are perfectly harmless, as far as our health is concerned, if we only have the sense to let them lie. This does not mean that we should never disturb the dust on our floors. It does mean that we should remove the dust in such a way as to avoid throwing it up into the air again. Nothing more ingenious could be devised than our present methods of dry-sweeping and dusting to start up the dust and germs from the floor and whisk them into our noses and mouths and eyes.

If our floors are laid of hard wood, or of narrow-boarded, closely fitted and matched soft wood, and then well painted or oiled and polished, so that they can be wiped with a damp cloth or slightly oiled rag, the sweeping process is largely solved. If the floor boards, moldings, window casings and seats, tables and larger furniture are cleaned in the same way, we shall be able to keep our rooms really dustless and to avoid a large part of the risks of the spread of disease through dust. Various compositions of asbestos, wood pulp, rubber, etc., which set hard and give a smooth, washable surface, are also very good. They cost a little more to lay than wood, though not more than good hard wood, but are more sanitary and more easily cleaned.

Washing the windows and paint. Windows ought to be kept scrupulously clean and bright, both to let in all the light possible and to allow us to see out through them clearly. Glass, while easy to wash, is hard to polish. On account of its transparency, every slight smear or film of dirt shows. A trace of soap, a mark of the scrubbing-cloth, or even the lint from the drying-cloth, gives the window an untidy appearance. In fact there is difficulty in using soap upon glass unless it can be rinsed off thoroughly with very hot water. Water used in washing windows must be frequently changed, because the dirt which was washed off in the first application leaves a thin smear when the pane dries. It is necessary, also, to use a great deal of water, spraying the panes down with the hose on the outside if possible, wiping them with a soft, clean cloth, and finally polishing them with a piece of chamois leather which leaves neither lint nor pattern marks on the glass.

Paint, also, must be cleaned carefully. The smooth shining surface or finish of paint is formed of a dried and hardened film of linseed oil. This resists cold water and most ordinary liquids, but, like any other fat, can be dissolved by very hot water or by soap and strong alkalies like ammonia or soda. Therefore paint should be washed with cloths dipped in cold or lukewarm water. If there are spots which will not come off, these may be removed by slightly moistening the cloth with alcohol or kerosene; but almost any of the ordinary

soaps, washing-powders, and ammonia will dissolve the film and eventually wash off the paint.

Soaps and sodas. Everybody knows the steamy, soapy smell of wash-day. Most of our washing is now done indoors with boilers and tubs. In an earlier day — and still in many parts of Europe — the washing was done out of doors. Women and girls came down to the edge of the stream with a bundle of clothes on their heads, knelt down beside the water, and washed the garments in the running water, scrubbing them on a flat stone, or beating them with clubs to pound the dirt out. Then they wrung out the washed clothes, shook them, spread them on the grass to dry, and sat down to rest.

It seems absurd to ask why we use water for cleansing purposes. Most of us, if asked, would say, "Why, it is natural!" or "Everybody does it!" A chemist would tell us that water is the most universal solvent. That is to say, it will melt and dissolve more different kinds of substances than all other liquids put together. It is common to think that alcohol or benzine are better solvents than water, but this is only because they will dissolve one class of substances which water will not dissolve — the fats, oils, and greases. These, however, represent only one kind of dirt, and there are many substances which alcohol or benzine will not dissolve at all, but which will melt readily in water.

Most of the dirt upon our clothing will come out in water. Some kinds, however, will not — chiefly

those which have some oil or grease in them. In order to make water dissolve these, we first heat it, and then add to it some other substance which will dissolve or combine with fats. Usually this is some form of alkali, such as soda, potash, or ammonia. As all these alkalies, when pure, are strong and likely to burn the hands, we dilute them with some form of fat. They can then be handled conveniently and set free slowly, in small amounts, so that they will not attack our skin. This combination of an alkali and a fat makes what we call soap, soda with the firmer fats forming hard soap, and lye or potash with pork, oil, or soft fats making a soft soap.

We must be careful, however, not to use these alkalies too strong. They have bad effects upon the hands, and also they attack the fiber of clothing, causing it to break down and wear out sooner than it should.

Ammonia, though an excellent solvent and cleanser, cannot be used as extensively as the other two alkalies, because it is what the chemists call *volatile* — that is, it evaporates in the air, forming a gas. This gas, as every one knows who has happened to take a whiff at the ammonia bottle, is pungent and irritating. In considerable amounts it is poisonous. An attempt to use ammonia on a large scale for washing, especially with hot water, would be both disagreeable and dangerous.

Our usual methods of laundering or washing are based on sound chemical methods, although we have

developed them without so much as knowing the name of an alkali or a solvent. Usually the clothing and household linen to be washed are sorted, so as to separate the colored fabrics from the white, and the coarser and more soiled from the finer and cleaner. Then the different groups are plunged into tubs or boilers of water, to which has been added soap or washing-powder — usually some form of the two fixed alkalies, soda or potash, or occasionally a little kerosene for its solvent effect on fats. Some allow the clothing to soak in this alkaline solution overnight. Others put the clothes to soak in a boiler on the stove, and bring the water to the boiling point. Boiling water, with the assistance of the alkali, dissolves the dirt in the clothing, while the bubbling of the gases in boiling mechanically assists in the process. Then the clothing is rinsed in two clean waters to remove the dissolved dirt and soap, passed through a wringer, and hung out on a line. Drying clothes out of doors serves a double purpose, for it not only dries them rapidly, but it gives an opportunity for the germ-killing action of the sun and air upon any germs or poisonous dirt which may still happen to cling to them.

The three other processes, bluing, starching, and ironing, have little to do with health, but are intended merely to improve the appearance of the fabrics. Ironing is of some benefit from a hygienic point of view, because the heat insures a thorough drying of any traces of moisture, and helps to de-

stroy, or at least discourage, any germs or toxins which may still cling to the garments. Starching merely fills the fabric with a harmless powder which, when moistened and heated, stiffens it and gives it the power of taking a glossy finish under the flat-iron.

Bleaching and bluing. Bleaching is a means of whitening linen or cotton or woolen fabrics by exposing them to the light. This whitening is due partly to the oxidation of the substances which give the fibers their original yellowish or grayish color, and partly to changes caused by the light. It also helps to remove certain oily or gummy substances which were of use to the fiber in its growth as a plant, or upon the back of the sheep. The process has little hygienic value, except that the prolonged exposure to air, light, and sunshine helps to make the cloth cleaner and more wholesome. It also makes it lighter and more porous by removing the heavy, gummy, unpleasant coloring matters. Nowadays a great part of the bleaching is accomplished by exposure of the cloth to the fumes of various chemicals. Most of these are fairly good germicides and none of them are particularly harmful. Bluing accomplishes the same purpose as bleaching by hiding the yellowish tint of the cloth.

CHAPTER VIII

THE BATHROOM

The shower and the tub. The presence or absence of a bathroom is what chiefly marks a house as modern or old-fashioned. A good bathroom requires the presence of water pipes and a constant flow of water under pressure in the house. Outside of the town or city limits, the problem of securing the necessary water pressure is a matter of considerable difficulty and expense. However, it is now entirely possible to install a water-supply system in a single house at a moderate expense, providing there is a good well or spring which furnishes a sufficient flow of water. Sometimes a reservoir may be made by damming a creek or brook. Then all that is needed is a tank at a sufficient height to force the water as high as the second story, and some means of pumping the water into the tank. There are also air-pressure methods which dispense with a tank and do away with the danger of freezing in winter.

The cheapest method of pumping — cheapest both to install and to run — is a windmill. As this depends on the wind for motor power, it is somewhat uncertain, is liable to get out of order, or may be damaged by storms. A better source of power is a gasoline engine, which can be installed at slightly

EVERYTHING RIGHT IN A BATHROOM

more expense than a windmill, and which may be relied upon — barring ordinary accidents — every day in the year. It is easy to run, and although its fuel is not as cheap as wind, the total expense of pumping enough water to supply an ordinary household is only a few cents a day.

The bathroom should have good air and light and waterproof walls and floor. A cement or tile floor is best, and a dado or wainscoting of tiles around the part of the room where the bath stands is a great advantage.

The question, " Which is the better form of bath, the shower or the tub? " can only be answered by saying, " Both." If water is scarce, the shower has the great advantage of taking only about a fourth of the amount required for the tub. It gives just as good results in the way of cleanliness, and almost as good results in the way of exhilaration and comfort. In fact, it gives a cleaner finish than does the tub, because every particle washed off the surface of the body goes straight down the escape pipe. The tub bath, if carelessly taken, may result in loosening the dirt from the most soiled portions of the body — hands, feet, and face — and dissolving it in the water, only to leave a thin film of it all over the body surface. It is a good way to combine the two, soaking and rubbing thoroughly in the tub, and then standing under the shower for a few seconds to finish off. Before getting into the tub or under the shower it is advisable to wash the hands, face,

and feet in the hand bowl, or a small foot tub. This keeps the bath water clean and makes the bath more pleasant and wholesome. Also, from a practical point of view, it makes the bathtub easier to scrub out and keep clean.

Hot baths and cold. There is a difference of opinion as to whether hot water or cold is better for bathing. Each is excellent in its place. Hot water has the great advantage of cleansing better, on account of its greater solvent power. It has the corresponding drawback of dissolving not only the greasy or oily dirt on the surface of the body, but also the natural protective oil of the skin. Too prolonged and too frequent washing with it is likely to leave the skin dry, irritable, and inclined to crack, because it has been deprived of its natural oil. Except when there is considerable dirt on the hands and face, it is usually best to wash in cool water, and avoid robbing the skin of its natural protection. Washing with hot water at night is comparatively harmless, because the skin is protected by the bedclothing for the next eight or nine hours, and not exposed to either changes of air or irritation of any sort until it has had time to recharge itself with its oily protective covering. In the case of dirts which stain the hands deeply, it is best not to scrub too hard or use too hot water or too strong soap, for you thus inflict much more damage upon the skin than the stain itself can do. Get off what you can with a moderate washing. Then let the perspiration grad-

ually loosen the stain and work it up toward the surface where it can be washed off, even if the process takes two or three days.

Hot baths should be taken at night, because they draw the blood to the surface, thus helping the skin to clean itself by perspiration. In the same way they help to wash the fatigue toxins out of the tired muscles and take out the soreness. A hot bath once or twice a week is sufficient. For daily morning use cold, or cool, baths are preferable: first, on account of their exhilarating effect; second, because they tone up the skin and protect against cold when you go out of doors; and third, because they do not deprive the skin of its natural oil and protection. There is no need to make a punishment of cold baths. Have them just cool enough to give you a pleasant sense of coolness and a gentle shock or thrill, and yet not so cold as to make it difficult to warm up and react promptly after them. If you are strong and well, a good plunge into cold water is a splendid tonic; but if you don't warm up and look rosy and feel comfortable directly after it, then you must add more warm water next time.

Brushes. Brushes have the same advantages and drawbacks as hot water and soaps. They take off the dirt, but they also remove a good deal of the oil of the skin with it, and — if used too enthusiastically — even some of the surface layers of the skin itself. They are chiefly of value for scrubbing places which it is hard to reach with water, such as under the

finger nails and toenails. The nail-brush should be used thoroughly at least once a day, preferably at night. We are apt to put our fingers near our mouths or noses at night, or to sleep with our hands covering or shading our faces. If any dirt or germs are left on the fingers, they can easily get into the mouth, nose, or eyes. Larger and softer brushes, known as flesh-brushes, are also useful to curry the skin and stimulate the circulation through it; but they should be used cautiously until the skin has become hardened to them. Otherwise they may scratch off the delicate surface layers, causing irritation and leaving cracks where dirt can lodge.

Powders and cold creams. Good powders and creams have a certain amount of usefulness upon the skin, but much less than is usually supposed. They help to repair the ravages of too energetic scrubbing or too hot water or too strong soap. The powders make a protective coating for the skin and fill up any tiny cracks. The creams do the same thing and, in addition, replace the natural oil of the skin if this has been scrubbed out. They are also useful, if the skin has become chapped or chafed or sunburnt or irritated in any way, in forming a soothing and protecting coating over the irritated surfaces. Beyond this they have little utility, and the habit of industriously rubbing them upon your face or hands every night is largely a waste of time and material, except for the benefit to the skin by the stimulating effect of the rubbing.

The only thing of the slightest value in these face creams is the oil or fat in them. There is no drug or remedy or preparation as yet discovered which will be of the slightest benefit to the healthy skin, no matter now faithfully applied. If the skin is in need of an extra supply of oil or protective, cold creams or powders may have some use; but if not, the cold cream manufactured by the skin itself is far better than anything invented by the pharmacists. The same may be said of the various cloths, sponges, or pads which are used in rubbing the face. Not one of them is equal to our natural massage pads, the firm, elastic, rubber-like tips of our fingers. A moderate amount of rubbing with these night and morning is a good thing for the complexion. The skin of the face perspires less than the body, is not rubbed at all by garments, and is the better for a little gentle rubbing and exercising. It is easy, however, to overdo even this form of massage. Increasing the flow of blood into the skin too greatly tends to thicken and harden it, and to cause the tiny hairs with which the whole surface of our faces is covered to grow slightly and become thicker and darker.

The various cold creams are composed chiefly of some form of oil or fat combined with some harmless powder to give them body or color, and scented to suit the taste. Formerly they were made largely of lard, with a little oil of almonds and some spermaceti. To-day vaseline, cosmoline, or some of the

other heavier petroleums are largely used. The so-called "vanishing creams" which can be rubbed in and caused to disappear are largely made of the curd of milk. The so-called "liquid creams" contain extract of quince seeds and other kinds of gums, with coloring and scenting substances added.

The complexion that won't come off. All that the most elaborate and expensive of complexion improvers can do is to patch up a protective surface over the skin when it has become cracked or dried or irritated. Perfectly healthy, clean, vigorous skin has a finer surface, a better bloom, and a richer color than anything that can be smeared on it. If the complexion is pale, it is because the blood is not rich enough, or is not being pumped through the skin with sufficient rapidity and in large enough amounts. The only way to cure this defect is by food and exercise in the open air. The beautiful glow of color in a good complexion comes from below the skin and cannot be imitated by anything painted on the surface. Keep your face well washed, moderately rubbed and massaged, your body well fed, and your muscles well exercised, and you will usually have a good complexion. Avoid all coloring substances for the face, which are not only objectionable to people of refinement, but sometimes are positively injurious.

The hair and the scalp. What has been said of the care of the skin applies to the scalp also. It should be well washed, well brushed, and given

plenty of air and sunlight. Beyond that, there is no known thing which can be done to improve it or make it grow a thicker or better crop of hair.

The hair is a part of the skin and grows out of a down-folded pouch of the skin. It is self-oiling, and none of the salves and tonics and restorers and dressings have the slightest effect in improving its condition or increasing its growth. It should be well brushed, because brushing is the only means which will clean it and give it friction. While most of the cleansing needed by the hair and scalp can be secured by thorough brushing, a good washing in hot water and soap about once a week for boys and once in two weeks for girls is helpful, since it removes any traces of dirt or dust which have escaped the brush.

The use of towels. The chief use of towels is to dry the skin or hair after washing. They are also useful on account of the rubbing and friction which they give the skin. They should be of loose spongy material in order to absorb readily the moisture from the skin. The same texture gives them a slightly rough surface which increases their stimulating effect. They should, of course, be washed frequently — at least twice a week. It is better still to have clean towels every day; and no one should use a towel which has been used by any one else. They should be hung where the air and, if possible, the sun can get at them. Even after the most careful washing and sluicing, a little of the oil of the

skin and perspiration will be rubbed off on them; and these, if allowed to remain warm and damp, will quickly decompose and become slightly rancid. It is well to remember that towels are simply to dry with, not to wash with. Some boys are inclined to do about half their washing on the towel.

The internal bath. It is hardly necessary to remind ourselves that we have an internal surface, as well as an external one, which is also in need of being kept clean and sanitary. The water that we drink and the secretions of our alimentary canal automatically clean and flush it, provided we are regular and systematic in allowing an opportunity for the escape of the waste. It is a considerable advantage to have a toilet-room in the house instead of twenty or thirty yards away out of doors, as used to be customary before water-supply systems were introduced. Frequently the call of nature will be disregarded or a response to it postponed in stormy or cold weather on account of the discomfort of a trip to an outdoor toilet. It is impossible to make cleanliness, either internal or external, too easy, and the bathroom and the toilet-room should be made as accessible, as attractive, and as comfortable as possible.

CHAPTER IX

THE FURNACE AND STOVES

Making our own climate. One of the most wonderful and useful discoveries ever made by the wit of man is fire-making. Before he could " make magic " in the shape of flame, man was an insignificant little prowling jungle beast, who climbed into the tree-tops every night to be safe from the attack of wild animals.

With fire in his hands, he had a charm against the fiercest beasts of the jungle. The circle of flickering light around his camp-fire was a haven of safety all night long. Fire brought him down from the trees and set him to swaggering on his hind legs and looking the world in the face. Then came cookery and pottery. One marvelous day he built his camp-fire on an outcropping ledge of blackish rock. The stuff melted, ran, hardened again, when it cooled, to a dark shiny metal — and his second greatest gift, iron, was in his grasp. Iron put an edge on his weapons, a tip on his plow, and gave him real tools with which to build boats, houses, and wheels and to conquer the earth. No wonder that most primitive races have legends relating how fire was brought down from heaven. They even give the name of the rash and venturesome mortal who first stole fire from the sky.

Even to this day we are still so immensely proud of our discovery that we are inclined to make too much of it in more ways than one. We make ourselves not only warm, but too warm; and our instinct for comfortable warmth is the only instinct against which we have to fight in the interests of our health. This is merely because it is the newest instinct and is not yet properly adjusted. We seldom drink too much water, or eat too much food, or take too much sleep, or breathe too much air, but we are inclined to make our rooms far too warm and our clothing too heavy. We can hardly blame ourselves greatly. It feels so good to be warm, and it is a marvelous triumph to keep ourselves not merely alive, but warm and comfortable in the sternest winters. The fire magic has liberated us from the tropics and made us citizens of the world, free to live anywhere on the globe where the summers are long enough to grow food to carry us through the winter.

One reason why we are inclined to make our houses too warm is that for the first time in history we have heating apparatus which will really heat, as well as houses built tightly enough to keep out the cold air. The old-fashioned open fireplace, which we often recall with poetic regret, was little better than a farce for heating purposes. Most of the heat made on its hearth went up the chimney. No matter how one piled on the logs and built up the fire, the only part of the room which was really

warm was a half-circle from six to nine feet deep directly in front of the fire. The draft made by the roaring fire kept the rest of the room cold. Besides, most old-fashioned houses were so poorly built that the wind fairly whistled through them whenever the thermometer dropped to zero or lower.

How to keep warm air fresh. However, there is nothing unwholesome about warmth. In fact, a reasonable and comfortable amount of it is necessary to health. Our modern air-tight houses with powerful furnaces are much more healthful than were the old, clammy, drafty stone heaps and barns which used to be called houses. There is no harm in having the air too warm, or even a little too dry, providing it is kept fresh and pure. It takes only a little thought and brains to enable us to have our air both warm and fresh. There is plenty of perfectly pure fresh air just outside our houses. All we need to do is to open the windows and let it in.

In fact, when we heat air, we set it moving at once, because the heat causes it to expand, like almost every other substance. This expansion makes it lighter, and it begins to rise. All we have to do is to provide an opening through which it can escape. This opening should be near the top of the room, because the hot air rises to the ceiling. By the same law of expansion, the colder outside air just as readily rushes into the room and fills the space vacated by the hot foul air. When we open a window at the top on a cold day a double current

begins to flow at once — hot air pouring out through the upper half or two thirds of the opening, and cold air pouring in through the lower third or half. By carefully adjusting the window sash so that neither too much cold air flows in nor too little hot air flows out, we can keep a room both comfortable and perfectly wholesome.

Steam heat and furnaces. We often hear steam heat and furnaces denounced as unwholesome, because they are liable to overheat and overdry the air in our houses. This is only because they are not intelligently managed. Even at their worst, they are better for the health than the old-fashioned open fireplace or scattered stoves. Each form has special advantages and disadvantages. The furnace is much cheaper to install and requires less skill to operate. Nowadays, any house of five or more rooms with a cellar can have a furnace. In fact, it will really save money in the long run, as the fuel bills will not be much greater than for a stove in each room. Add to this the saving in labor and expense of cleaning and general wear and tear from carrying coal to and ashes from the separate stoves in each room, and you find little financial difference in the two methods. The furnace has also the advantage of drawing its air more or less directly from the outside. It comes through the cold-air shaft into the hot-air chamber, where it is warmed, and then rises through the pipes and registers to the different rooms of the house. This method assures

us a greater supply of hot air that is fairly fresh and pure. However, a certain amount of the cold air from the floor of the living-rooms flows into the hot-air chamber, either through cold hot-air pipes, or through special pipes provided in some systems of house furnaces for the purpose. Consequently the air coming up through the registers is not always perfectly pure. On the other hand, the furnace method has the disadvantage of being rather wasteful of fuel as compared with steam or hot water. Also, it will fail to heat properly certain rooms in the house, or it will not heat certain rooms when the wind is from a particular quarter. It is also likely that, when the temperature drops to zero or below, the engineer of the furnace, in order to save the quantity of fuel needed to heat this extremely cold air up to house temperature, will shut off the cold-air duct opening to the outside and draw his air from the cellar or through cold tubes from the unused rooms of the house. On the whole, however, a little care and hygienic intelligence in handling the house furnace will give good results both in point of comfort and of health.

A great hygienic advantage of any of these central systems of heating located in the cellar or basement is that they keep the air of the cellar dry, warm, and wholesome, and warm the entire house. It is well to have the floors and passageways fairly warm, so that the occupants of the house may move about freely, and to have the bedrooms sufficiently warm

to enable one to open a window at night without fear of being almost frozen while dressing in the morning. As a matter of fact, it is only in houses which are thoroughly well warmed, usually with some central method of heating, that you will secure proper ventilation in winter time.

Steam or hot-water systems of heating are more expensive to put in and skill is required to operate them. However, they have the advantage, where the number of rooms to be heated is considerable, of using less fuel because they waste less heat; of preserving a more uniform temperature; and of being much more reliable than the hot-air furnace as a means of heating every room in the house. The problem of ventilation in large buildings may be solved by providing some special artificial system of ventilation. In private houses, and in most school buildings, ventilation can be managed very satisfactorily by a skillful use of open windows.

Gas and oil. Gas should be burned in a fireplace, or under a metal hood with a pipe opening into a flue. The same may be said of the oil stove or heater. Neither gas nor oil stoves should be relied upon for steady heating, but both are occasionally useful. If the stove is carefully watched, and the room is provided with plenty of fresh air, such heaters add much to the comfort of a room without being dangerous to health. But they should always be regarded with suspicion.

CHAPTER X

THE BEDROOM

Why we need air at night. There is no room in the house which should be more thoroughly flushed with fresh, cool air than the bedroom. We need air at night, just as we do in the daytime. Though we breathe more slowly when we are asleep than when we are awake, because we are not burning up our body fuel so rapidly by exercise, we really need as much oxygen per hour when we are asleep as when we are awake; for, while we breathe in more air during the daytime, we do not breathe it in fast enough to keep pace with the amount of work done with our muscles. Consequently, carbon dioxide and other waste products collect in our blood during the day faster than we can dispose of them.

One of the reasons why we sleep and rest at night is to regain our balance of oxygen, throw off our carbon dioxide and other poisonous wastes, and lay in a store of surplus oxygen for the next day. It is most important, therefore, that we should have an abundance of fresh, pure air to breathe at night.

How our skins breathe. Moreover, we need plenty of air in our bedrooms because our skins give off a great deal of moisture and waste products and some gases. During the day this vapor and gas is

more or less held in by our thick, heavy, close-fitting, and often sweaty clothing. When we undress at night, we give our skins a good breath of fresh air. When we put on light, loose night clothing and get between clean sheets, the skin keeps on breathing and purifying itself all night long better than it can do in the day. If the bedroom is not properly ventilated and the bed is not well shaken up and aired during the day, these gases and watery vapors from the skin collect in it. That is what gives a stuffy, sour smell to a bed which is not properly cared for, or a bedroom where the windows are kept shut.

Why drafts are healthful. When we are warm in bed, under good blankets, we can endure and enjoy a current of cool, pure air blowing across our faces, even when the temperature of the room is below forty degrees. It is a good thing, not merely to have plenty of fresh air at night, but to have a current of it that we can distinctly feel blowing across our faces. Lying still all night long, with our heads half-buried in the pillow, the warm, impure air which we breathe out is more likely to hang about our heads and faces than when we are moving about in the day. The only thing which carries our breath away from our faces, and from the hollow in the pillow, and from under the bedclothes, is the fact that air is warm and tends to rise. This change, however, occurs slowly, and often is not sufficient to keep the air about our faces and nostrils pure. Indeed,

in hot weather, when the temperature rises above eighty degrees, there is danger of our faces becoming "drowned" in a pool of our own breath, unless there is a current of air to blow it away.

Moreover, we have found that one of the tonics required to keep us in health is the striking of currents of cool or cold air upon various parts of our body surface. In fact, drafts, unless cold enough to make us really uncomfortable, are not dangerous. Their alternate chilling and warming, breezing and blanketing of the surface can go on more or less all over our body while we are up and about in the day. At night, the only part of our surface open to this kind of healthful stimulation is the face, and we need for health a cool, fresh current of air blowing across our faces all night long.

Sheets, blankets, and coverlets. The covers which we put on our beds at night are like a loose-fitting suit of clothes. They are made up of much the same materials as our day garments, and for the same reasons.

Next to our skins we put a sheet of cotton or linen, partly because it is cool and smooth and soft and feels comfortable, but chiefly because it can be easily washed and frequently changed. As the sheets catch a good deal of the perspiration and waste products which are given off by our skins during the night, they should be thoroughly aired and exposed to the light and sun every day. When we rise, we should turn down the covers and leave

A BEDROOM AND PLAYROOM

Of course, it is pleasant to have a special playroom for tea-parties. Still, you can have healthy, happy play in your own room if you have plenty of sunshine, air, and shelves for books and toys.

the bed open for at least an hour or two before it is made up again. Because the sheets can be so easily washed and changed, it is a good thing to make them two or three feet longer than the blankets, so that they can be turned back over the blankets and coverlets at the top in a broad fold which will stay in place during the night and keep the heavier coverings from coming in contact with our faces.

Next to the sheets come warm, porous woolen stuffs known as blankets. Almost every nation or

tribe which can grow or get wool sleeps under blankets. This is because they combine lightness and wearing quality with warmth. In an earlier day, they were easier to fold up and carry about to the next night's sleeping-place than any other mat or skin. Bacon and blankets are the two chief necessities of the soldier the world over.

While woolen blankets are warmest, a satisfactory substitute for all but the coldest weather is now made of loosely woven and fleecy cotton. These cotton blankets are not so warm in proportion to their weight, but they are cheaper and more easily washed. Unless handled very carefully, they are inclined to shrink, become harder, and lose a great deal of their porousness. The warmth of bedding, as of garments, depends largely upon its porousness, that is, the amount of air which it can keep entangled in its meshes.

Over the blankets comes the quilt or coverlet. This may be a purely ornamental affair intended to make the bed look white and neat and to cover the blankets from dust. This type of cover is good, because it keeps the blankets clean and, when pulled up over them at the top at night, prevents them from coming in contact with our faces. Spreads should not be made so ornamental that there is any hesitation about having them washed frequently.

The other type of coverlet or comfort is that used in cold weather for additional warmth. This should

be as light and porous as possible to give the maximum of warmth with the minimum of weight, and also to interfere as little as possible with the breathing of our skins and the circulation of air through our bed coverings. One of the best combinations from both these points of view is the cotton-lined coverlet, made of layers of fine cotton-batting covered with cheesecloth. Such coverlets may be made as ornamental and dainty as one pleases, with silk borders, and knots of ribbon or silk or yarn; but they should not be made too delicate to wash. If washed at regular intervals, and aired and ventilated thoroughly every day, they can be kept perfectly clean and sanitary. When the night is cold enough to require more than three blankets it is best to use a comfort, as four blankets (two pair) are uncomfortably and undesirably heavy. Other winter coverlets are filled either with eider-down or with ordinary feathers. In Germany, the bedding is still of a delightful simplicity. You lie down upon one feather bed and pull another over you — with sheets, of course, in between. It takes a lifelong training to be able to stay under that uneasy feather bed without sticking out, first at the end, then at the sides, and finally to avoid shuffling it off on the floor. These down coverlets have the great objection of being almost air-tight. If they are a little too heavy, or the night is unexpectedly warm, they are likely to overheat and to prevent the proper ventilation of the skin. The German ones may not, because

they leave wide gaps all round the edge of the bed. Down coverlets should be used cautiously, particularly in the case of young children who are likely to throw off the covers and get chilled. If eider-down quilts are made quite light, and not too wide, so as to lie as a kind of flat covering over the body without tucking tightly in at the sides, they are fairly healthful and very comfortable.

Pillows and mattresses. Pillows prop up the head and keep it in a straight line with the backbone when we are lying down. Man is the only animal needing a pillow, because he is the only one having square or projecting shoulders. The thickness of the pillow should be exactly that of the breadth of the shoulder, from the side of the neck to the outer end of the collar-bone. Anything lower strains the neck by letting the head sag, and makes us uncomfortable by interfering with the circulation of the blood through the brain. Anything thicker or higher strains the neck in the opposite direction, and by pressure upon the carotid arteries and jugular veins also interferes to some degree with the circulation of the blood through the brain. For some foolish reason the impression has gone abroad that it is healthful to sleep without any pillow at all. There is absolutely no foundation in hygiene or in common sense for this idea.

Pillows should be made of some light, soft, fairly firm substance, covered with a washable case; and the experiments of centuries have shown that noth-

ing combines these various good points so well as some form of down or fine feathers. Our primitive ancestors were not so particular. A convenient stone, a log of wood, a saddle, a bag of meal, or a folded cloak served the purpose. The Chinese to-day use nothing for a pillow but a rounded and polished log of wood about four or five inches in diameter. If the pillow is too soft, the head will be buried in it so deeply that the nostrils will be partially obstructed, and the foul air of our breath will settle down into the hollow thus made.

A mattress is a thick, padded covering for the bed-springs, firm enough to support the body, but soft enough so that the projecting bones of our hips and shoulders will not become sore from pressure. The best materials for this purpose are curled horsehair, felt, straw, or wool. The best of these is curled horsehair, because it is fairly firm, is elastic and porous, and can be thoroughly cleansed. The worst is wool, because it is inclined to pack, lose its porousness, and absorb odors and perspiration. Feathers once were commonly used for this purpose, but except in very cold weather and in poorly heated rooms they should be avoided. While they are soft and warm, they rise up on all sides of the body so as almost to imbed it, and interfere seriously with the proper action of the skin.

There is no merit, however, in having a mattress too hard. It should be firm enough to support the body evenly on the projecting bony prominences of

the shoulders and hips, the knees and ankles, and yet soft enough to be perfectly comfortable and give no feeling of soreness or strain.

Windows and walls. Since a bedroom needs to be well ventilated, it should have plenty of windows, preferably on two sides of the room. If this is impossible, the bedroom should have at least two windows, even if both of these are on the same side, to allow some circulation of air between them.

The bedroom needs an abundance of light and particularly of sunlight. Windows should be curtained as lightly as possible, and provided with only sufficient blinds or shades to secure the proper protection while dressing and undressing, and should be open wide to light and sunlight all day long. Few things are more unwholesome and depressing than a dark, airless, poorly lighted bedroom.

The walls should be painted or papered in some light, cheerful shade, both for the purpose of increasing the purifying effect of light and also to give the room a cheerful, attractive appearance. They should be easily wiped down and kept clean, and should be hung with but few pictures and ornaments. These catch and hold dust, and interfere with the sweeping down of walls with a broom covered with a cloth. Bric-à-brac, ornaments, and elaborate hangings are out of place in a bedroom.

CHAPTER XI

THE LIVING-ROOM, PLAY-ROOM, AND WORKSHOP

Where we live. The sitting-room, or living-room, is the place in the house where we really live. It should be made the most attractive, usable, and livable room in the house. Plenty of light, plenty of fresh air, plenty of warmth in winter time, plenty of comfortable places in which to sit, and the necessary tables or shelves on which to keep our work or our books or our pictures — that is all the furniture it needs. No matter how expensively it is fitted up, it is a failure if it is not cozy and usable and convenient for every member of the family.

Chairs for comfort. The most essential thing in furnishing a living-room or sitting-room is at least one thoroughly comfortable, roomy, backward-sloping, well-cushioned, and well-fitting chair for each member of the family, and several more for guests. These chairs should be made to sit in, not to look at, and each should be deliberately chosen for an individual member of the family. The best way to produce a taste for reading and study in the family is to have thoroughly comfortable reading-chairs which invite you to sit down in them and make you content to stay in them. When a living-room has this equipment of chairs, it is well fur-

nished. The only other things really needed are one or two tables and low bookcases to hold the books that you happen to be reading, or the work that you happen to be doing. A few attractive pictures on the walls and as slight curtains at the windows as the conscience of the model housekeeper will permit complete the furnishings.

Tables for use. The tables should be adapted to the size of the family and the arrangements of the room. If the sitting-room is also the dining-room, then the dining-table will make an admirable and roomy workbench, particularly if it can be mounted on real casters and rolled to one side or the other of the room between meals. Unless the room is used for a dining-room, it is usually better to have two or three medium-sized or small tables placed against the wall wherever they may be convenient to receive a book or paper or piece of handwork. If the living-room is also the library, which is the most cozy and attractive arrangement, the bookcases should be made low and with rather broad shelves. The broad top of the highest shelf, which should not be more than four and a half or five feet high, may be used for whatever papers, puzzles, wood-carvings, or other fancy-work the family may have on hand. These shelves are also convenient for one or two pots or vases of flowers. The walls above may be hung with a few interesting pictures which the family really like. The taste of the youngest as well as the oldest should be represented.

ONE CORNER OF A GOOD LIVING-ROOM

Carpets and rugs. Anything that looks warm and attractive and feels soft under the foot is a good floor covering. It must be remembered that the chief use of the room will be in the evenings after supper; and the colors of the rug should look cheerful by lamplight. Any warm and cheerful color or combination of colors is better than dull or dingy hues which are chosen because they do not show dirt and will not fade in the sun. On the whole, a hard-wood or well-painted floor, covered with a rug or rugs, is best, because it is more easily kept clean, and gives less chance for the accumulation of dust and lint.

There should be plenty of floor coverings, so that all the children — and grown-ups, if they wish — may have abundant room to sit and play upon the floor with comfort. Great care should be taken to have the floor free from splinters, so that children may be safe on them even in their bare feet, and free from cracks and crevices, so that if dirt collects, it cannot accumulate in places where it will be hard to get at it. The floor should never be so brilliantly polished as to make it unsafe for any one to walk quickly or run across it.

Sweeping and dusting. In the living-room a carpet sweeper should first be used to pick up the big dirt, and be followed by a damp or slightly oiled cloth on the end of a mop-stick or tied over a broom. The ordinary broom and feather duster should never

be allowed inside the living-room. Hygienically speaking, they are worse than useless, for they whisk and whirl the dust from the floor and carpets, where it is doing nobody serious harm, and drive it into the air, to be breathed into our noses. It is better to have a number of small rugs than one or two large ones, because it is so much easier to pick them up and take them out of doors and give them the thorough beating and exposure to the sun and air which is really needed to make them fit to walk or play upon.

Paper and paint. Both paper and paint in the sitting-room should have a hard, smooth surface, so that they may be easily wiped clean. The colors should be bright and cheerful to reflect the light and increase its health-giving and antiseptic effects. Even in the most beautifully built and ideally situated houses, it seldom happens that any living-room can have too much light in it, except possibly during a month or two in the summer. As the living-room is to be occupied chiefly at night, the colors of the paper and woodwork may be somewhat richer, deeper, and more decorative than those of the bedrooms. For the woodwork, nothing is better than the natural woods, particularly of the lighter shades, rubbed down and oil-finished, but not varnished, as this gives too glassy an effect. The natural patterns of the grained woods are always attractive, and no two pieces are ever alike.

Elaborate designs or raised patterns upon the

wall-papers or paint should be avoided, because their principal use is to conceal dust, fly specks, and other dirt. It is a great hygienic advantage to have the walls and woodwork show every speck of dirt promptly. Walls should be so treated as to furnish good backgrounds for the few pictures hung upon them, and the paper should never be so obtrusive as to distract the eye from the more important things in the room.

Unhealthful curtains. The most beautiful, as well as the most wholesome and permanently attractive pictures are those seen through the windows. The finest landscapes we can put upon our walls are those which grow outdoors; and everything which interferes with the free view into Nature's ever-changing art gallery should be removed.

Shutters are a particularly stupid and unhygienic survival of the Dark Ages. They are useless as protection against modern methods of burglary, and the other bogies which they were once intended to keep out have melted into thin air. They shut out light, interfere with ventilation, and are useless by day and by night, except perhaps for a few hours in the middle of the day during the summer months.

Blinds should be so hung that they can be put entirely out of sight and out of the way except when they are needed to shut out blazing sunlight. Only the lightest and flimsiest of curtains are necessary, for the dread that vicious or spiteful people may peep in and discover the secrets of our harmless

HEALTH AND GOOD TASTE IN THE LIVING-ROOM

Notice the big swinging window, the door opening out on the piazza, the comfortable chair and couch, the few good ornaments and pictures, and somebody's collection of ribbons and medals just below the shelf. Wouldn't you think that a happy and healthy family lived in this house?

household life is also a survival of the Dark Ages. No blinds or curtains or shutters should be allowed for a moment to interfere with the proper ventilation of the room either day or night. That ridiculous craving for privacy which makes us close our houses at night as if they were robbers' caves is a survival of the time when our ancestors were nervous about prowling bears and "gobberlins."

Nothing too good to use. This should be the motto of the living-room, and everything in it should be in

accord with the motto. We may be thankful that in the modern home we seldom see the formal best parlor intended "for company." As guests are entertained only at intervals, it is absurd to sacrifice, as often used to be done, one of the best rooms in the house for their occasional use. This sacrifice was made on the altar of our vanity and foolish pride. What is good enough for us ought to be good enough for any of our friends who really care to see us.

The children's room. Every room in the house, except the kitchen during business hours, ought to be a children's room. A house should be mainly a place in which to raise children. Still, where space is available, it is a great convenience for both the little folk and the housekeeping authorities to have one room, not necessarily very large, but warm, cozy, well lighted, and easy to reach, devoted largely to the play, work, and enjoyment of children.

The furniture should be simple, the most important article of it being the floor, which should be well warmed and covered with a soft thick rug or carpet thoroughly comfortable and convenient to play upon. The surface should not be too rough or uneven. Carts should wheel across it easily, and tin soldiers should readily stand upright upon it. The best covering is really one of the cork or rubber carpets, such as are used in hospitals, providing it is kept thoroughly warm by furnace or steam heat. There should be chairs of different sizes, and several

small tables which can be readily dragged to places where they may be required. There should be a big case — half rack, half box — in one corner, where all the playthings may be kept at night. Where possible, add an inexpensive workbench or table, where work can be done, and a sand-box where cities can be built and forts constructed.

If a room can possibly be secured elsewhere, this playroom should not be in the garret or in an upper story to strain short legs and little backs unnecessarily. An important part of its equipment, whereever it can be arranged, is a door with steps leading outdoors, and a small hallway or cloakroom just inside. Here the dirt which is brought in on tiny shoes and the treasures which are lugged in by chubby arms may be caught, before being spread all over the floors of the house.

Where work is play. Every house where there are children in the family should have a bench and toolrack. If there is no barn or shed where space may be found for this purpose, a part of the house should be devoted to it, — possibly a well-lighted, well-ventilated portion of the basement, or some small room toward the back of the house.

The chief objection to having a workshop in the house is not so much the shavings, sawdust, and untidiness that must be made, but the noise. The hammer, the saw, and the file are deadly instruments to sensitive ear drums. The best arrangement is to have the workshop in a small shed, or in

the barn. The instinct for workmanship is one of the deepest and most important impulses of child nature. No amount of trouble and scheming is too great to give the boy a chance to construct things. He will find out more about practical mathematics by building a box, or a trap, or a boat, or a flying machine, than he will in years of textbook study and mechanical drawing.

The bench and its lighting. While almost any kind of bench is better than none, and any sort of table or supported plank which is solid enough to hammer on and steady enough to saw and chisel on, will serve the purpose, it is well worth while to take a little trouble to make the bench fit the boy who is going to work at it. If there are two or three sizes of boy in the family, then it is a good thing to have two different levels, terrace fashion, at the one bench. Pains should be taken to place the bench in a good light, the best being overhead light from a skylight. This can sometimes be secured in a shed or barn. The next best arrangement is light coming from directly over the bench so that it strikes down upon the tools and the work at about the same angle as it is reflected up to the eye. The window of the workshop may face in almost any direction, because it is seldom used for more than an hour or two at a time. Where it can be secured, north light is the best for the bench, although, for the sake of the sunshine, the room should have light from the south or southwest by other windows.

A REAL WORKSHOP EDUCATES THE BOY

CHAPTER XII

THE PORCHES

The healthiest room in the house. The original porch was simply a sort of little lean-to or permanent awning over the front door to keep the rain from beating in when it was opened. We have learned how to build better, now, and, recognizing its possibilities, we have enlarged our idea of the porch. In modern families it is usually regarded as an outdoor living-room for use all day long in summer and for part of the day in all but the coldest months. In some houses this idea is rather overdone, the porch being carried around so much of the house as to interfere seriously with the light and sun of the downstairs living-rooms. However, this difficulty can be largely avoided by making the porch high enough to allow plenty of light and air to come in during the winter, and by shutting off the surplus sun in summer with porch screens and shades. Indeed, the disadvantage of cutting off a certain amount of light and sun is more than counterbalanced by the opportunity to keep the windows open without danger of rain or snow beating in.

The porch is particularly valuable for children, furnishing them with a dry floor upon which they can play in almost any kind of weather. The more

we live on our porches and make them a much-used part of the house, the healthier, happier, and more comfortable we shall be.

Outdoor tables and chairs. For a long time, the porch was little better than a stiff, narrow, shaded shelf or extra-wide step in front of the house. It was hardly wide enough for a chair, let alone a table. If members of the family ventured to sit on it, they had to range themselves in a stiff, unsociable row, with their backs against the wall, and trip over one another's feet every time they wanted to change places or go into the house.

The modern porch is built deep and wide — at least eight to ten feet — and is fitted up with chairs, tables, hammocks, and lounges just like a living-room in the house. The chairs and tables, of course, should be of some rustic or plain make, so that they will not be hurt by the weather if they happen to get wet. It is an addition to our comfort and health to have part of the porch arranged to communicate by a door with the dining-room or kitchen, screened from direct view of the street, and used for a dining-room in the summer, or at least for a breakfast-room.

Insect screens and shades. This part of the porch should be screened with wire screening against flies or other insects. It is always a good idea to have some portion of the porch protected in this way, except where the manure and garbage heaps of the entire neighborhood are properly kept,

and there are no flies, and the neighboring swamps are drained so as to prevent mosquitoes.

It is also a great convenience to have two or three hanging shades or curtains of split bamboo, coarse canvas, or burlap, which can be hung on hooks and easily shifted from one part of the porch to another. By means of these one can shut out the midday sun in summer, or shade some part of the porch for reading or writing, or secure privacy when the house is too near the street.

The roof of the porch should be high — at least nine or ten feet at the free edge — in order to let plenty of light and air into the downstairs rooms, even in winter time. It is well to have most of the porch surrounded by a light balustrade or lattice-work, or even a low solid parapet, because it gives better protection from the weather and keeps books, papers, work, and toys from being blown out in case of a sudden wind-storm.

The sleeping-porch. Another use for the porch in recent years is as a summer sleeping-room. For this purpose an upstairs porch or a railed-in part of the roof of the downstairs porch, with a canopy over it, is most suitable. It is a great advantage to health and comfort in the hot weather, and one of the best preventives of consumption or other lung diseases ever discovered.

It is best to have a wide door opening directly out of the bedroom upon the sleeping-porch. If a severe storm comes up in the night, the bed can be

HOW TO SLEEP OUT OF DOORS

rolled back upon its casters into shelter. It is also advisable to have the porch surrounded with wire or cotton mosquito netting, so that neither mosquitoes nor flies will interfere with sleep and comfort.

It is surprising how, once you have formed the habit of sleeping on a porch, you will want to keep it up until late in the fall or even early in the winter, and begin it again as soon as the first mild weather comes in the spring. No one really knows how thoroughly enjoyable and refreshing sleep can be until he has tried sleeping in the open air.

The back porch and summer kitchen. A most important part of the house is the back porch, which is a kind of anteroom to the kitchen. It is an excellent thing to have this made wide and deep and screened against flies or insects. Many household tasks in summer time can be performed here in the open air. A well-screened back porch where the refrigerator can stand, where beans and peas can be prepared, and where fruit and vegetables can be kept, is as great an advantage to the health of the family as a front porch is to its comfort and enjoyment. It should be provided with a table and some plain chairs and utilized as a summer kitchen and workroom. One end of it may be equipped for a children's playroom in pleasant weather. In the hot summer weather a big tub placed in the middle of the children's porch and half filled with cool water is a comfortable impromptu bathing-beach.

WRONG AND RIGHT BACK PORCHES

It costs only a few dollars to furnish a living-porch, and the comfort and health it brings to the family is worth many times the money.

CHAPTER XIII

THE BARN AND THE OUTBUILDINGS

Outdoors with a roof on it. The barn is one of the most interesting and useful parts of the homestead. In the country, of course, it is the "business end" of the establishment; and a thrifty farmer would consider himself badly off if his barn were not at least twice the size of his house. But even where it has shrunk to the modest proportions allowed by a town lot, with accommodations for a single cow and a pair of horses, a pig, and a score of chickens, it still remains an important factor in the health and comfort of the family. The child who has not had some sort of barn to play in while he was growing up, has been robbed of one of his most precious birthrights.

Next to out of doors, a barn is a boy's chief playground. A boy who has parents who can read and write, a barn, and a garden will be fairly educated whether he ever goes to school or not. There is always something to do in a barn. There is corn to be given to horses and cattle, there is hay to be thrown down for them, stalls to be cleaned and bedded down; there are horses to be curried, cows to be milked, chickens to be fed, eggs to be gathered, corn to be shelled, and harnesses to be dusted and

oiled. A barn has somewhat the same attraction for a boy that a doll's house has for a girl. The lessons of responsibility for the care of others, of pleasure in seeing animals thriving and comfortable, of regular duties and constant watchfulness, of feeling that you are of some use in the world, are among the most valuable in life.

The haymow and hay chutes. In addition to all this feeling of occupation and accomplishment, the barn is the finest play-place imaginable, especially on rainy days. In spite of the fact that certain parts of the old-fashioned barn were dirty and unhealthful, on the whole it was a wholesome place for vigorous play. The old-fashioned barn was so generous in the matter of open doors and windows, or so loosely built, that it was self-ventilating. Although there were various chutes, openings, and perpendicular ladders where life and limb might be risked, and plenty of places where the dirtiest kind of dirt gathered, the percentage of accidents was very small. For the most part, the modern barn is a cleaner, wholesomer place for children to play; but it occasionally suffers from the defects of this very virtue, and is built so much like a house that it is n't ventilated properly, or is kept in such tidy condition that children are discouraged from playing there for fear of "making a muss."

The indoor play-room. It should be remembered by parents that children, if not the most profitable, are by far the most valuable and important stock

that can be raised in a barn; and that the barn or stable should afford a place for play, amusement, and training for the children of the family. Some special room in the barn should be set aside as a play-room for their use, where they can have their toys and little tools. There may be tables and stools and a doll's house for the girls, a tool-rack for the boys, and plenty of odds and ends, such as broken boards, old furniture, boxes, buckets, tins, scrap iron, and all the varieties of delightful junk that boys and girls need in their business of constructing a new world in their plays of make-believe.

The stalls and their cleaning and lighting. In the main, the better a barn is kept for its own purposes, the better play-place it is for children. The old barn was dark in the corners, particularly around the granary and the harness-room, or up under the eaves over the haymow. It was full of dirt and dust, which was not exactly wholesome to get into scratches or inhale into noses and lungs. It was this same dust which, as we have seen, made trouble when it got into the milk. The modern barn, with its abundance of clean, well-kept windows, and floods of light everywhere, its smooth walls and tight floors which are swept and kept free of dust, is a great improvement upon the old, loosely built, half-lighted structures, where you could nearly suffocate yourself at any time by jumping up and down on one or two of the loose boards and starting the dust flying.

The old-fashioned cow stalls and horse stalls, floored with rough, knotty planks laid often upon axe-trimmed logs for floor beams, could not be kept decently clean and free from odor. The floor was not closely laid; indeed, very frequently a gap was left between the planks at its edge, in order to allow for the drainage of moisture and the scraping through of the finer parts of the manure dust. That meant that filth gathered under the whole floor of this part of the barn.

In the modern barn the stalls are floored with concrete, or else with heavy matched or closely laid boards, coated over with tar or pitch, which makes a smooth waterproof surface. This flooring is laid on a slight slant to a shallow gutter running just behind the heels of the animals, and the gutter again has a gentle slope in order to carry away all drainage. This drainage is usually delivered in a tank under the floor of the barn, from which it can be pumped into a hogshead upon a wagon and carried out into the fields where it makes a most valuable fertilizer. Where the barn stands high enough at the downhill end, the gutters discharge the fluids and the wash-water from the floor of the barn directly into a portable tank on wheels, which can be hauled out to the fields as quickly as it fills. With this kind of floor, by using chaff or sawdust for bedding with a little land plaster to absorb the fluids and odors, the barn can be kept as clean, and almost as odorless, as a workshop or woodshed. Milk produced in such

a barn as this, with no dust overhead, and no dirt from the floor on the flanks and udder of the cow, will be clean, sweet, and wholesome.

The chicken-house. The chicken-house is another portion of the homestead which, whether it be a part of the barn or a separate building by itself, requires careful sanitary inspection. The manure which accumulates in the henhouse, although small in amount and easily handled, becomes so offensive from the large amount of ammonia which it gives off that special steps must be taken toward keeping it cleaned out.

The floor of the chicken-house, or at least of that part of it which is used for roosts and nests, should be laid in cement or floored with some smooth, close-fitting planking, tarred or pitched, or otherwise coated so as to make it easily cleaned. With this sort of surface, and a broom or hoe, it is easy to remove the manure which is so valuable a fertilizer that it pays to save it properly.

The roosts also should be coated in some way, and the walls of the house, and the tops and sides of the nest-boxes, made smooth and even, so that they can be readily whitewashed. They should be brushed down with a broom at least once or twice a month, and whitewashed at least twice a year. These measures are useful, not merely in preventing the henhouse from becoming offensive, but also because no lodging-place is left for one of the greatest enemies of all poultry, fleas. If the henhouse

be kept as described, and is occasionally sprinkled with some insect-destroyer, there will be little risk of the flock being infected with these troublesome parasites. The interiors and floors of the nest-boxes should also be made smooth and be whitewashed, and the material used for lining the nests should be burned at least once a month during the summer and replaced with a fresh supply. This will destroy any parasites that may have established themselves, and will help to keep the flock in good condition. The henhouse kept in this way will be almost devoid of offensive odors, will make the birds healthier, and more thrifty, and will produce a better yield.

The pig and his pen. If the homestead is so situated that pigs can be kept, they should be cared for in much the same way. The pig is a much-maligned animal. Though he occasionally takes delight in wallowing in a pool of soft mud and water, as most of us have done in creek or river in our boyhood, he is not naturally a dirty animal. Those who have given him a fair chance say that he enjoys being clean, and will meet you halfway in your attempts to improve his sanitary condition. At all events, although pigs like a certain amount of clean, fresh dirt to roll and root in, they do much better, are less subject to disease, and give better returns on their food rations, if they are kept on a clean, firm floor, with clean, dry beds, and if they are given such food that their troughs can be kept

clean. Slops are about the poorest diet that a pig can have, and he is supposed to like them only because he will eat them if he can't get anything else.

The modern pigpen used by breeders of pedigreed swine has a cement floor which can be washed down readily, and a small bed or sleeping-platform of boards which is supplied with a moderate amount of clean, dry litter. The floor of the pen is swept or washed down every day. The corner in which the trough is kept is close to the drainage opening. The trough itself is thoroughly cleaned out at least once a day. The pigs are curried daily with a stiff brush and frequently brushed with a broom, and the place is as free from odor as a haymow. They have a well-drained and cleanly kept dirt yard in which they are allowed to run when the weather is suitable. Pigs kept like this seldom or never get cholera.

The manure heap, good servant but bad master. A valuable but troublesome product of the barn is its manure heap. On account of its odor and offensive appearance, its danger as a source of flies, and the annoyance of handling it, manure is more or less of a nuisance. It would be altogether a nuisance if it were not for its value as fertilizer. Luckily, the methods of handling which preserve its fertilizing value are also those which make it less offensive and dangerous.

In other words, the sooner that the manure can be hauled out on the soil and plowed under, the

more perfectly will all of its fertilizing value be preserved. Fresh or raw manure, however, hurts the roots and leaves of growing plants. Hence it cannot be spread upon the soil which is under crop. It must undergo a thorough rotting and mellowing before the rootlets can use it. Therefore it is well to have, all through the summer season, some area of ground either lying fallow or just cleared of a crop, where the manure can be spread upon the soil and plowed under; or else to have a manure or compost heap, either in a shed near the barn closed in and screened thoroughly against flies, or else a quarter of a mile away, where, by mixing the manure with borax or sulphate of iron, it can be kept comparatively free from the fly maggots.

The old method of handling manure was bad both from the point of view of economy and of health. Throwing it out of the rear door of the barn, or down through a hole in the floor, and allowing it to pile up was a wasteful method. It was exposed to every storm, and the rain or snow water soaked down through it, washing away anywhere from fifteen to fifty per cent of its fertilizing value. As soon as the warm weather came, the flies swarmed all over it, laying their eggs in it by the thousand, and their offspring rose in clouds to make life a burden for every living thing within three hundred yards.

The modern method of handling manure is either to have standing at the back of the barn a wagon with a box-bed, into which the manure is thrown to

be hauled out on to the land as fast as it is filled, or else to have it thrown into a tight-walled shed which preserves all the fertilizing value of it. This is fitted with a screen over the windows, and a swinging plank or wire-screen door, which will allow the manure to be thrown into the box, but falls back of its own weight and shuts out the flies. In towns and villages the manure may be thrown into a box and then taken away by wagons which call for it every ten days, and every week in hot weather. The box should have a tight floor to prevent flies breeding underneath it, and there should be an opening toward the light, over which is tightly placed a fly-trap to catch any flies which may get into the box.

The drainage of the barnyard. Any one who expected a barnyard to be anything but muddy and ill-smelling in the fall and winter used to be regarded as a finical person. The amount of stock kept, the careless way of handling manure, and the utter absence of proper drainage made the average barnyard in winter and spring a foul-smelling bog. Most of us can remember the chain of stones which ran from the house to the barn door, to be used as stepping-stones across the quagmire in early spring. This condition, however, has been greatly improved. The cause of the trouble was that, while the farmer took great pains to drain and underdrain his fields where his crops were to be grown, he never dreamed of spending money for drainage about his barnyard or in his feed-lots. A few hundred feet of tiling,

A DISGRACE TO THE CITY

This heap of decaying garbage and trash lies at the entrance to a tenement where coats and artificial flowers are made. What do you think about the health of the people who live there? What do you think about the city garbage collector's duty?

costing not more than twenty or thirty dollars, laid around the south and west sides of the barn, and carrying the rainwater from the ground surface and roofs out to the side of the nearest hill or the bank of the nearest stream, will make all the difference between filth and cleanliness. By taking a little trouble to grade the surface of the barnyard and feed-lots so that they will slope gently toward a central point, where a grating connecting with the drain can be put in, and by hauling a few loads of gravel or ashes during the slack season to coat over the surface, a barnyard and even a feed-lot may be kept clean, dry, and wholesome.

CHAPTER XIV

THE LOT AND GARDEN

The world with a fence around it. Next to the house and barn, the most important spot in the universe is our garden and yard. It is the garden and grounds which give to a home half its beauty, provide it with its sunlight and fresh air, and furnish a place for rest and recreation in the open air. While a garden can be laid out in a hundred different ways, there are two or three simple principles which have to be followed in practically all cases.

It should be deep enough at front and back, and wide enough at the sides, to allow plenty of fresh air to circulate on all sides of the house in all directions of the wind, and to have plenty of light at all hours of the day and at all seasons of the year. Its surface should be so planted as to be free from dust or dirt, and so graded and drained that water will not stand there or soak in under the house. It should be made as attractive as the soil, climate, and circumstances will permit. Any piece of ground which fulfills these requirements is a good and satisfactory place for a healthy life. Any size, shape, arrangement, or method of planting or treating which interferes with these requirements is bad from the point of view of health and comfort.

THE RIGHT KIND OF BACK-YARD PLAYHOUSE

The front yard and its flowers. Almost every lot is roughly divided into three parts — the front yard, the house and its borders, and the back yard. The front yard is generally made ornamental and the back yard is more or less useful. Sometimes it is more accurate to say that the front yard is tidy and the back yard untidy; but this occurs less and less frequently as people in general learn the need of sanitation.

Though there are a hundred different ways of beautifying the front garden, its attractiveness is best secured by grass or turf. Flowers and shrubs are beautiful, but their beauty often lasts only a few weeks or months, while the fresh green grass is a constant joy to the eye anywhere from six to ten months of the year, according to the latitude. Grass has another advantage, from a sanitary point of view. It forms a practically dust-free and mud-free coating all the year round. From it nothing blows into the house, nothing is carried on to the porches and the floors. With this soft green carpet as a background, beautiful effects can be produced by flowers and shrubs and trees. Flowers should be used chiefly to heighten by contrast the greenness, softness, and smoothness of the turf, although if any one likes a great variety of flowers, there is no hygienic reason why he should not grow them.

The planting and training of trees and shrubs, however, should be kept strictly within certain limits. They should never be allowed to grow to

such a size as to cut off any considerable share of light and sun from the house or windows. The habit of allowing trees or vines to grow close to the side of a house is undesirable from a sanitary point of view. Unless they are carefully trimmed, they darken the rooms, make the house damp, rot its shingles, and block up its eave-spouts by the leaves, twigs, bark scales, insects, etc., which they perpetually shed upon it. Shrubbery more than five or six feet high should not be allowed to grow against the walls of the house, as it makes them damp and furnishes a home for insects. Neither trees nor shrubs should be planted so as to interfere with the view from any of the windows of the house, unless they are placed at a considerable distance to hide some less desirable feature of the landscape.

The back yard and its cans. Unfortunately, the back yard is often used simply as a kind of convenient dumping-ground for odds and ends. Instead, it should be made one of the most useful and attractive portions of the lot. Where it is large enough, it can be used as a vegetable garden. Every house should have a few beds of the commoner vegetables, and as many rows as possible of the hardier varieties of fruit. The exercise of working in the garden is wholesome and healthful. Children delight in having a little piece of ground of their own, where they may plant anything they please and watch it grow. A tract of ground where vegetables and flowers can be grown and drainage or digging and

building operations carried out is of great educational and hygienic value.

The garbage-can and its visitors. In the country and parts of towns where chickens and pigs are kept, the garbage problem may be solved by carrying the food waste two or three times a day directly from the kitchen to the chicken-yard or pigpen. Where this cannot be done, a suitable can should be provided, large enough to hold twenty-four hours' garbage. It should be well galvanized, so that it will not be attacked by the acids in food and will keep a smooth surface that can be readily cleaned. It should be heavy enough to stand considerable wear and tear, and fitted with a tight lid which will shut in odors and keep out flies. The old swill-pail was a sanitary nuisance. It was usually too big and too clumsy to be conveniently emptied or easily cleaned. Day after day the food and slops from the kitchen were dumped into it and then scooped out of it into buckets to be carried to the pigs or chickens. There was always a layer left at the bottom, and sufficient scraps sticking on the sides to sour and putrefy. A constant fermentation and souring went on in the contents of the tub. It was a free-lunch counter for all the swarms of flies in the neighborhood that fed eagerly over it, swarmed into the house and over the tables for dessert, and then went to lay their eggs in the near-by manure heaps. Another group of visitors were the stray cats and dogs of the neighborhood, most of whom had a regu-



Courtesy Russell Sage Foundation

THREE DEADLY DANGERS

The manure-heap, the outhouse near the well, and the open sewer are a disgrace to any community. They cost in medicine, doctor's bills, and human lives far more than the operation of sewer and street-cleaning systems.

lar lunch route of swill-tubs and garbage-barrels. They pulled out pieces of food that they could not eat and dropped them on the ground to putrefy and attract fresh swarms of flies. In many cases the rats of the neighborhood came to the garbage-barrels to feed and drag pieces of food away under the floors of the buildings to putrefy and give off unwholesome odors.

Garbage-burners. In nearly all towns and cities carts now come around at least once and sometimes twice a day to collect the garbage. In many small towns, villages, and even country districts, where chickens and pigs are not kept on the premises, one may arrange with a neighbor who has chickens or pigs to come and gather up the garbage for the sake of its food value. Wherever neither of these methods can be depended upon, it is well for each house to provide itself with some sort of small garbage-burner or rubbish-furnace. This need be nothing more than a simple sheet-iron box with a grating inside upon which the garbage is placed and under which a fire is built; or an old disused stove may be used, or an oven-like structure of bricks or cement. The garbage should be thoroughly drained over the sink or into the sewer, to remove the moisture and make it burn more readily. There is usually fat or starch or meat enough in most garbage to furnish a fair amount of fuel. Where garbage is to be disposed of in this way, it is well to have a kerosene can near the garbage-barrel and pour a table-

Courtesy Town Room, Boston

AN IDEAL CITY ALLEY AND BACK YARDS

Clean grass on which to play, neat garbage cans, trim walks, no trash lying about, and no place for flies to breed — this is the way a self-respecting and hygienic community likes to keep its back yards and alleys.

spoonful or more over each deposit of garbage. This prevents the flies from feeding on it and laying their eggs in it, and kills any maggots that may be developing in it. Also it makes the refuse easier to burn.

Any sort of waste material, such as shavings, straw, odds and ends of wood, old newspapers, broken boxes, and so forth, or a barrel of crude oil which costs little and lasts a long time, may be used in burning the garbage. A considerable part of the coal in ordinary ashes from a house still remains unburned, and if a sifter or screen be provided, so that the dust of the ashes can be screened out of it, the coarse part may be mixed with the garbage and furnish a considerable amount of the heat needed to burn it. There should be such a burning-place as this in every back yard, where all kinds of trash, sweepings, scraps, and all waste which will not go into the sewer or the garbage-can may be destroyed.

Waste water and the well. In those households which draw their water-supply from a well, it is usually situated in the back yard. This is convenient to the kitchen where the water is chiefly needed; but if any wash-water, or dish-water, or scraps of garbage, are thrown out to litter the surface of the back yard, they are apt to be washed down into the soil by the rains and ultimately to seep their way into the well.

In most soils where there is no layer of rock or waterproof clay or hardpan close to the surface, a well will drain an area of soil in every direction of from two to four times its own depth. Practically

every kind of dirt which is allowed to gather in an ordinary back yard, including the refuse from the stable, henhouse, and pigpen, is liable to be washed into the well, especially during wet weather. Fortunately, it is now the habit to put the barns, pig-pens, sheds, and outbuildings a fair distance away from the house in order to avoid flies, odors, and seepage.

The yard and grounds for at least twenty to forty paces around the well in every direction should be kept scrupulously clean. If there is no regular sewer, a pipe should be laid from the kitchen sink and the back door, running out either into the nearest field, or to the side of the nearest creek or gully. Where this cannot be done, the pipe should run into some patch of porous cultivated ground where the roots of the crops or of the trees will break up the waste matter and make it harmless. The upper three or four feet of the wall of the well should be thoroughly cemented, both inside and out, to prevent the washing of the surface soil or dirt into the water. The top of the well should be roofed over with a wide, firm platform of close-fitting matched boards, which should be well painted and leaded along their edges, so as to keep out waste water. This well-cover, or platform, should be so arranged that it can be lifted up at least once a month and the well carefully examined to see whether any rats, mice, or squirrels may have bored their way through the wall of the well and fallen into the water, or whether any frogs or toads have worked their way into it.

Most animals and insects are fond of water. It is surprising how many different kinds of creatures and bugs and crawling things will manage to find their way into a well, and their decaying bodies will often make the water bad to drink. At least once a year every well should be pumped dry, opened, and thoroughly cleaned. In spite of all care, a certain amount of dust, dirt, leaf mould, and insects will fall into a well and make a deposit of mud or sludge. This should be thoroughly cleaned out and the well scraped down. After the cleaning and before the well is again used, the water should be allowed to come in two or three times, each time being pumped out. If the well is deep, it is always safest to lower a lighted candle or lamp to the bottom before lowering any one into it to clean it out, because the vegetable matter which grows around the walls and falls into the bottom of a well often decays and gives off so much carbon dioxide as to make the air dangerous to breathe. If the well is carefully protected, the slops and waste waters carried away in a short drain at least forty or fifty yards from the well, and the vault privy thoroughly cemented, made waterproof, and emptied at regular intervals, a perfectly safe and wholesome supply of drinking-water can be taken from a well in the country or village. In towns, however, it is practically impossible to be sure that all sorts of leakage and contamination are avoided, and surface wells should never be depended upon for a drinking-water supply.

SECTION III — HEALTH IN THE SCHOOL

CHAPTER XV

WINDOWS AND DOORS

The price we pay for shelter. When men first began to build houses, they were merely trying to make a place where they could sleep at night or take shelter in the daytime when it rained. Indeed, the first houses were not built at all, but were caves in the side of a hill or holes in the face of a cliff which primitive man dug out larger and protected with a curtain or door across the front to keep out the wind and rain. They were much like the playhouses which boys delight to scrape out in the side of a bank.

Then men learned to build rough shacks of branches and reeds and grass out in the open, and by and by they managed to make a roof tight enough to shed rain. When they could build a warm dry hut, they could live where they pleased. By leaving a hole in one side big enough to crawl through, but small enough to be closed at night with a slab of stone or log of wood, they kept out snakes and wild beasts and thought they had a house to be proud of. However, to protect themselves from weather and wild beasts, they had to sacrifice light and air, so they still spent most of their time and did all their

cooking out of doors. Even to-day, with all our improvements in house-building, we still must lose some of our light and air when we go indoors.

Holes for light, windows. It was hundreds of years after man reached the stage of hut-building before houses became much more than dark, uncomfortable huts, with only one small door. There was no iron for hinges or locks and bolts. There were no windows, because if holes were cut for air, they let in cold at night, and rain and snow whenever the weather was bad. As tools were invented and improved, huts were made somewhat bigger and more convenient. The fireplace was moved indoors by the simple process of laying a crude stone fireplace in the middle of the room and leaving a hole in the roof for the smoke to get out. It is hard to believe that our ancestors ever lived so roughly and inconveniently as this, yet barely a hundred years ago one of our greatest men, Abraham Lincoln, was born in a cabin little better than this. Indeed, up to two or three hundred years ago, the houses in which most people lived were dark and dirty. Only the very rich could buy glass, and most people had no substance which would keep out rain and cold and at the same time let in light and sun. The windows had to be small and few to keep the rooms warm and dry in cold weather. Even well-to-do people could afford only small window frames with thin strips of oiled paper or cloth which let a little light filter through.

When we first began to make glass, we knew how to make it only in small, thick, lumpy pieces, which had to be held together with strips of lead in order to get a pane of moderate size. Windows were then pieced together like the stained glass in modern church windows or in lattices. Later we learned to blow glass so that we could get flat or curved pieces four or five inches square, and these were made into small window panes. It was not until fifty or sixty years ago that we were able to get clear, smooth

Courtesy Soc. for the Control of Tuberculosis, Boston

NAIL-BRUSH DRILL IN SCHOOL

Clean hands make clean work, and clean fingernails prevent hangnails. Many schools now have a nail-brush drill two or three times a week, and sometimes every day.

glass in panes more than eighteen inches square, except at a very high price. The large plate-glass windows that make a room almost as light as outdoors have come into ordinary use only within the last thirty years. But these beautiful transparent windows of ours, though they let in the light, still keep out the air. We don't open them half as often as we should, because we have still the cave dweller's dread of the cold or rain which used to come in when the shutter in the hut was left open.

Why our ancestors made doors. For a long time we made the doors of our houses much too small and had too few of them, because in the beginning they were simply a slab of bark or slice of tree-trunk, and so the openings had to be kept as small as possible. Besides, we had such poor tools and hardware that doors sagged on their hinges if they were made large; and they fitted so badly that wind and rain came in around the edges of their casings. A door was a permanently weak spot in the wall of the house. Even to-day, when we have learned to make hinges that will swing a ten-foot door as easily and smoothly as the old ones did a five-foot one, and when we can make doors fit as tight as a trunk-lid, we don't put enough of them in our houses or our schoolrooms. There should be at least two doors in every house or schoolhouse. Four are better. There should be at least two in every room, in order that we may get in and out quickly in case of fire or other danger, and also air the room thoroughly. The outside doors

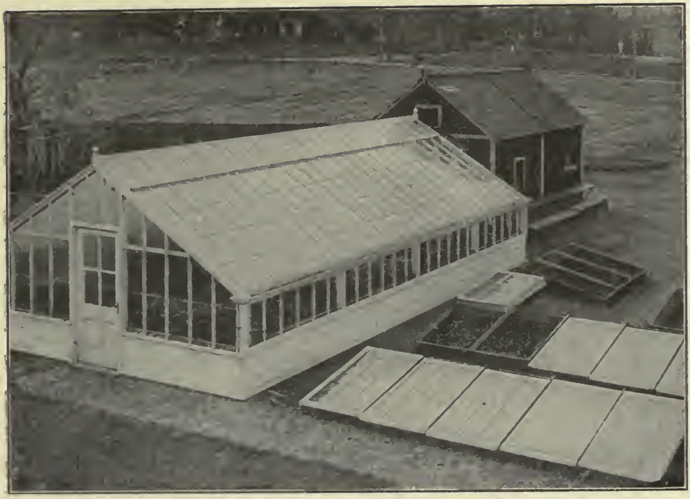
of schoolhouses should always be built to swing outward so there may be no danger of their getting jammed shut. There should also be a "panic bar," or long handle, running across the door, which, when pushed against at any point, will immediately turn the latch and let the door swing open.

How to use our eyes. The main purpose of letting light into our rooms and houses is that we may use it to see by; although it is also valuable because it kills germs and molds and putrefactions of all sorts. It takes plenty of window space to let in enough light to read and work by comfortably.

In schoolrooms the area of the windows added together ought to equal about one fifth or one fourth of the size of the floor. Every schoolroom should have windows in two sides of it. This makes the room very much easier to ventilate, and enables every pupil to have plenty of light coming from the right direction when he is at his desk or at the blackboard. If bright light shines directly into our eyes, it tends to dazzle us so that we don't see clearly. The best arrangement is to have the light fall upon the book or paper from over the left shoulder. When it does this, the rays of light fall upon the page we are reading and then are reflected back to our eyes at an angle that enables us to see clearly without dazzling us. It is better to have the light come over the left shoulder because if it comes over the right shoulder it throws the shadow of the pen and of the hand upon the paper.

If the windows are at one side and at one end of the room, the desks ought to be arranged with their backs toward the side or end which has the windows in it. This makes it a little hard for the teacher, if she likes to have her platform facing the pupils; but she can usually protect herself by means of shades or a screen, or put her desk, say, at the middle of the side of the room. The windows should be provided with roller shades of some dark color, such as dark-green or dark-brown, so that if the sun shines in too brightly at any time of the day it can be prevented from shining into the faces of the children or on the pages of the books. When the desks are arranged to run the long way of the room, the shades can be pulled down on two or three of the windows farthest toward the front, so as to keep the light from striking directly into the faces of any of the pupils. Carefully arranging the seats and adjusting the blinds or shades of the windows will prevent a great deal of strain on the eyes in school work.

The blackboard as a rule should be on the side or sides of the room which have no windows. If it is necessary to place the blackboard on the window side of the room, the shades should be pulled down on that side when the blackboard is in use, so that the light will not glare directly into the eyes of the children when they are working at the board. Even if the light from the other sides of the room is not quite so bright, it will strain the eyes of the children



Courtesy Russell Sage Foundation, N. Y.

WHOLESOME WORK IN THE SCHOOL GARDEN

Fine vegetables and healthy children are raised in these school gardens.

much less. By making the figures and outlines larger, there will be no difficulty in seeing the work quite plainly and easily.

Why we need change of air. Even with the largest and most beautiful windows placed upon two sides of a room, it is hard to keep indoor air as fresh and wholesome as that of outdoors. The air in any room will begin to be hot and stale after an hour or two. Especially in a schoolroom, where there are twenty or thirty persons each breathing twenty times a minute and perspiring all the time, it quickly begins to smell stuffy. Once every hour at the close of some recitation period, it is best to throw windows and doors wide open and let the pupils march around the room several times, or stand up and sing, or go through some light gymnastic or calisthenic movements in the aisles for five or six minutes. This changes the air in the room and in our lungs, sets the blood to circulating vigorously in our veins, takes the kinks out of our shoulders, and the cobwebs out of our brains. At the end of two hours we usually have a recess of from ten to twenty minutes, giving time to go out of doors and have a good scamper around the playground. It is a good thing to make several changes each day to shops or workrooms in addition to the recesses in the open air. This gives us a change of air and exercises every part of our brains and bodies.

CHAPTER XVI

FURNACES, STOVES, AND REGISTERS — HEATING AND VENTILATING

Why we need warmth. The main reason why we need warmth indoors is that we have acquired the habit of sitting still when we work and using our brains instead of our muscles. When we worked hard all day long in the woods or in the fields, went to bed with the chickens, and slept all night under mats or deerskins, we did n't need much fire in the hut except for cooking purposes. But when we began to sit still and think or read and write most of the day, then we needed a good fire to keep us warm.

When we use our muscles, we burn up a great deal of food and waste, and this makes us warm Also the heart beats fast and drives the hot blood all over the body and keeps our skins warm and glowing. Though the brain needs fuel to work with, it does not require a quarter as much as our muscles do, and when we work with our minds we are not manufacturing much heat. Our hearts beat more slowly. The blood tends to move quietly in its channels through the interior of our bodies instead of rushing to the surface. Our skins begin to be cool and pale, and unless the room is comfortably warm, we soon begin to feel shivery.

Making our own heat. Even when we are sitting perfectly still, our bodies are still manufacturing a fair amount of heat, particularly in our great three-pound sugar factory, the liver. The heart in its steady pumping burns up a good deal of fuel, and also gives off heat. Even if the air about us is twenty-five or thirty degrees below that of our normal body heat, we can still manage to feel comfortable. As our natural body heat is about ninety-eight and a half degrees (98.6), we must have the air around our bodies somewhere about seventy degrees if we want to keep comfortable while we are sitting still. Warmth in a house is not a vital necessity like food or water or air, but it is important for our comfort. We cannot fix our minds on our books when our feet are like ice, or write or do sums or draw with fingers that are stiff with the cold. We need about sixty-five to seventy degrees of heat for comfort, but we can exist without serious risk to our health if the temperature is only fifty-five or sixty.

When coolness helps. Remember it is necessary to keep up this sixty-five to seventy degree temperature only when we are studying or writing or sitting still after meals. If we are moving about actively at any sort of indoor work, we feel warm at five or even fifteen degrees less; and when we are covered up in bed we can let the temperature go down to fifty, forty, or even thirty, without any injury. In fact, we shall feel all the brisker for it when we

wake up in the morning. Remember that though it is uncomfortable to be not quite warm enough, it is not actually unhealthful if we are in fairly vigorous condition; but to be even a little too warm is not only much more uncomfortable, but a positive injury to our health. The room which is a little too hot is doing you positive harm, and you should throw open the windows at once and let in the cool, fresh air from outside, even if it may seem a little chilly for the moment. The best temperature is one that you do not notice at all; but it is always safer to have the air of a schoolroom a little too cool than a little too hot. Our best mental and muscular work is done in air which feels brisk and fresh and a little cool.

How air moves. While warmth above fifty degrees is a matter of comfort, air is a matter of life and death. One of our most troublesome problems of indoor sanitation is the difficulty of securing warmth and fresh air at the same time. As we have already seen, when air is heated, it expands. Expansion makes it lighter, and it tends to rise skyward, where its heat does n't do us any good, unless we put a cover over it to hold it down. The roof of a house or the ceiling of a room acts as such a cover, and it does n't take long for fire in a stove to heat all the air in a room if the doors and windows are all shut. Meantime, the people in that room are pouring into it their hot and steamy breaths, as well as the perspiration from the warm surface of their

bodies, and the air soon begins to feel hot and stuffy. If we throw open the windows or the door, the hot air instantly rushes out and up to the clouds, and the room is filled again with cold air from the outside. We say " br-r-r-rr! " and shut the windows quickly. By the time we have cooked this fresh roomful of air to a comfortable temperature, it begins to become foul and stuffy and we have to let it out again. There is a constant seesaw all day long in cold weather between coolness and warmth, fresh air and foul.

Second-hand air. The best we can do is to work out a compromise between ventilation and warmth. Even the best arrangement possible must be constantly watched, changed, and adjusted every hour or two according to changes in the wind and the weather or time of day. It is well worth all the trouble that it takes.

The scheme which usually works best is to let the hot second-hand air escape gradually, a little at a time, and let in the cold outside air slowly enough so that it has the chill taken off it before it strikes us. Where the room is properly supplied with windows on two or more sides, keeping several of them open at the top, varying according to the direction of the wind and the coldness of the day, will usually give a good working result. Indeed, no better system of ventilation has yet been invented. If this method is supplemented by throwing wide open doors and windows and airing the room at regular

intervals during calisthenics and at each recess, it will usually give fairly good ventilation.

What discourages germs. To let plenty of sunlight into the room and keep free currents of fresh air constantly moving through it is the best possible destroyer of germs. But because an open window sometimes gives an uncomfortably cool draft of air, and because it is sometimes difficult to keep all the room at a uniform temperature by window ventilation, various elaborate systems of artificial ventilation have been invented. These draw in the cold fresh air near the furnace, warm it to the desired temperature, and then send it all over the building. It may rise by its own heat, or be driven with fans, or sucked through the building by fans placed at the other end of the ventilation pipes. These artificial systems of ventilation are much better than no ventilation at all, but need to be helped out by the use of open windows in order to keep the air fresh for children to breathe. Any so-called system of ventilation which demands that the windows be kept closed is a sanitary nuisance and a menace to health.

The open window classroom. Somewhat similar methods work well in a good many schools to-day. The heating system is relied upon to keep the walls and floors of the building thoroughly warm and dry. When school session begins, the windows of the classroom are thrown wide open, except on the side toward a cold wind or a rainstorm. The children, if

Courtesy Soc. for Control of Tuberculosis, Boston.

PREPARING THE SCHOOL LUNCH

The white dish on the table contains baked macaroni, the teacher is stirring soup, and one of the girls is cutting the bread. The cost of the noon meal is ten cents.

they wish it, are allowed to wear their outdoor coats or cloaks, and they are also permitted to change their seats and move about the room while they are doing their work. Recitation periods are short and there are a good many singing, marching, and calisthenic periods, with frequent recesses. The children are given a lunch in the middle of the morning or middle of the afternoon, or are encouraged to eat more food at their regular meals. They usually do this willingly enough, because the fresh air and the

Courtesy New York School Lunch Committee

EATING THE SCHOOL LUNCH

Many cities now serve a bowl of good hot soup to school children at recess, and find that they do better work and lose less time from sickness than before lunches were served.

moving about give them a much better appetite. Letting the children move about freely allows them to manufacture their own heat through muscular action, and the extra amount of food provides the fuel for this purpose. Careful records have been kept and comparisons made between rooms of a given grade treated in this way and others of the same grade in the same building in similar classrooms with the windows closed, or nearly so. In every case it was found that the children passed

better examinations, made more rapid progress, and had fewer coughs, colds, and catarrhs in the open-window room.

Open-air classes. In the schools of most of our larger cities now, classes are arranged to do all their studying and reciting in the open air. Some of the classes are held on a balcony, or the open roof, or in some specially arranged park or grounds. For the most part, the pupils in these classes are those who are either suffering from tuberculosis or are weak and out of health so that they are believed to be in danger of an attack.

In rainy weather, the classes are held on an open balcony or roofed-in porch, and in cold weather the children are supplied with a thick, warm Eskimo suit with a hood, and a bag with a hot soapstone in it for their feet. In this costume they can sit out and study even in the coldest winter weather. Almost always their health improves greatly, they gain rapidly in weight, and they make more rapid progress in their studies than do the children in the classes from which they have been taken in the schoolroom. It is believed by some of our best teachers that before very long nearly half of our school work will be done in the open air, both for the sake of our health and also for more rapid progress in school work.

CHAPTER XVII

THE DESKS AND BLACKBOARDS — POSTURE, RECITING, SINGING, AND DRAWING

Why we sit still. We sit at desks or tables in school in order to do work with books and papers which cannot well be done standing or while moving about. The sooner we can get the work done and the less sitting still we do, the better for our health. The best way to avoid too much sitting still is to fix our minds on our work and finish it just as fast and as well as we possibly can. It used to be considered necessary to spend three fourths of the time in school sitting at a desk. Now many of our best schools devote only about one third of the pupil's time to desk work. There is no merit in sitting still just to learn to sit still, and so long as we work hard and fast, it does n't matter how much we wriggle. There is no known way of making sitting still healthy for children. The only thing is to reduce it to its lowest possible terms.

Seats and desks that fit us. While we are sitting to read and write, we should select desks which are fitted to our height and size, so that our bodies can be comfortable while our minds are at work. The school seat should be placed at the height of our knees. When we sit down upon it, it should be low

enough so that the whole soles of both feet rest comfortably on the floor, and high enough so that it does not double up our knees and throw our bodies backward. The top of the desk or table should be of such height that when we sit comfortably and fairly upright in the seat, with the right arm bent, the elbow will rest comfortably upon it. The edge of the desk or table should be almost directly above the front of the seat or chair, although at some ages and for some kinds of work a slight overhang of an inch or an inch and a half is more comfortable. The best seat ever invented is a light, well-shaped chair, with a moderately sloping back curved to fit the natural curves of the body; and the best desk is a simple table, light enough to be easily moved about, but firm enough to be perfectly steady for writing. Chairs and tables take up a little more room than desks, but that is one of their advantages. Children should not be packed at two-foot intervals in rows of seats crowded together like sardines in a can. Tables and chairs will supply seats for all the children that the room is big enough to provide air for. These tables and chairs can be made in the school shops by the upper grades and repaired and replaced as needed. Another great advantage of tables and chairs is that they can be promptly cleared away and stacked up around the walls of the rooms to leave space for drills, dances, and play.

Crooked backs and round shoulders. We have often been told of the importance of keeping our

heads up, our shoulders back, and our backs straight. Nothing is more ungainly or worse for our chest development than rounded shoulders, humped backs, or slouching carriage. These bowed backs and rounded shoulders are in part due to careless ways of sitting or standing, but they are much more due to a lack of vigorous active exercise and proper amount of food. This lack of food may be due to a badly planned diet, but more often it comes from the poor appetite caused by sleeping in ill-ventilated rooms and failing to get a proper amount of play and exercise in the open air.

We must remember that the human body is naturally built in curves, and that the constant pull of vigorous and well-nourished muscles is necessary in order to draw those curves into that comparatively straight line which we call good carriage of the body. The moment our muscles become weak and our blood poor, we sag. Play hard, wholesomely, happily; eat plenty of good wholesome food to meet the appetite that comes from such play; and you won't have much trouble with round shoulders or crooked backs, even if you should have to sit still longer than is desirable, or in seats and at desks which do not fit you.

Our body tires before our mind does. Comfortable seats and desks, plenty of change of position, drill, dancing, play, work at the bench or in the school garden, are important from the mental point of view as well as the physical one. The more care-

fully we study the reasons for getting tired in school or at office work, the more we find that it is the body, not the mind, which tires. If we keep our bodies rested by plenty of good air, change of position, comfortable seats and desks, frequent changes of occupation and chances for rest, our minds will keep on at work for a surprising length of time without marked fatigue. When we say, for instance, that our eyes are tired, it is not the optic nerve or nerve of sight which is tired, but the little muscles inside the eye which, by their contraction, shorten the focus of the eye and adjust it for near work like reading and writing. If we shut up our books and run outside and look up into the tops of the trees for apples, or follow the flight of a baseball, our eyes begin to feel rested, although we are still using them hard.

Another form of tiredness that comes from reading too long is in the little muscles outside of the eyeball that move it from side to side. These become tired from constantly running along one line and back to the beginning of the next. Also it makes them tired to pull the eyes together so as to focus both of them on the page.

Our tiredness after writing too long does not come from our eyes or even from the writing center in the brain, but from the cramping and weariness of the muscles of the hand and arm. If we watch carefully the different groups of muscles in our own body and as soon as they begin to get tired change our position

or the nature of our work so as to avoid cramping or overtiring in one small group, we shall be able to do a great deal more work in the course of the day and with less danger to our health and comfort.

Blackboards and eye-strain and dust. The blackboard is a valuable part of the school-room outfit, because it gives our eyes a change from the short-range, quickly tiring use of books and papers to long-range use of the sight across the width of the room. It gives us a certain amount of hand and arm exercise, as well as a change of position, and enables us to draw large pictures of the things that we have in our minds instead of describing them in the small, cramped scratches we call writing.

Blackboards, however, have two great drawbacks. It is difficult to prevent some of them from being placed between windows, which makes our eyes dazzle when we try to read what is written on them. To correct this, the shades may be pulled down during blackboard exercises; or only one half to one third of the class may be sent to the blackboard at a time, so as to use only those portions of the blackboard which are on the walls opposite the windows or at right angles to them.

Another drawback is the dust made by the chalk and crayons. If this is not thoroughly cleaned off, the clear dead black or green of the board becomes a dull gray after a few months' use, and the mark of the crayon does not show clearly. That means eye-strain. If this dust is cleaned off too vigorously, and

the dusters are beaten out in the schoolroom, the air becomes filled with the clay or chalk dust, which irritates eyes, nose, and mouth, and soils clothing and books. These drawbacks may be corrected by having the blackboard thoroughly washed at frequent intervals. Erasers should be used only for making changes in the blackboard work during classes. At the end of the day, the board should be wiped with a cloth which can be shaken out of doors and frequently washed. The so-called dustless crayons are not very satisfactory, inasmuch as they are likely to contain talc and other semi-greasy substances, which make the surface of the blackboard smudgy and slippery to the touch of the crayons.

Why we stand up to recite. Our habit of standing up to recite is in part a survival of the dress-parade methods of the drill sergeant, and in part a simple way of giving us some slight change of posture and occupation. Putting our hands behind us and straightening our backs is also a good change of position after bending over the desks. In many schools change of position is afforded by calisthenics in the halls, or by marching around the room and singing. All of these are excellent for the health, providing that you don't stamp hard enough to raise unnecessary dust.

CHAPTER XVIII

FLOORS, HALLS, STAIRS, AND BASEMENTS

Floors and dust. The question of the schoolroom floor has always been a troublesome one. No paint, polish, or other finish has ever been invented that will withstand the trampling of scores of restless feet. Carpets are equally out of the question. A bare floor wears out just as rapidly as a painted or polished one, developing cracks, splinters, and a soft, spongy surface, which furnishes such a foothold for dust and dirt that it cannot be kept clean after a few months or years of wear. Consequently, it is very difficult, especially in old or crowded school buildings, to keep the schoolroom free from dust. As this dust consists of the mud of the streets and contains large quantities of dried manure, it is not a wholesome thing to have floating in the air we breathe. In many schoolrooms the filing out of the classes will raise a visible cloud of dust; and any attempt at marching or dancing will send almost as much dust as oxygen into the lungs of the children.

The best modern school buildings have either hard-wood or narrow-board hard-pine floors. If these are well laid and kept constantly oiled, polished, and cleaned, a good deal of the dust nuisance may be avoided. Vigorous scrubbing will keep the

nuisance down to a certain degree, but it shortens the life of the floor. Various forms of dressings with crude oil and other substances have been devised, but although these keep down the dust, they darken and blacken the floor, making it unattractive and often staining the hems of dresses.

Various other substances than wood have been tried for schoolroom floors. In some cases we have gone back to the stone slabs or flags with which the ground floors in old buildings were sometimes laid. These, however, are cold and damp in winter. Moreover, they may break anything which is dropped on them, from an ink-bottle to a child's head, and they are exceedingly noisy. Cement has the disadvantage of being considerably more expensive to lay than wood, because it requires much heavier floor beams to carry it and prevent its cracking; also, it is somewhat noisy. But it has the great advantage of wearing like iron and always keeping a smooth, hard, washable surface, which can be kept spotlessly clean with little effort. Also it can be rounded over the corners at the base of the walls, so as to leave an absolutely dirt-proof, dust-proof surface without joint or crack. It is of a pleasing color naturally, and can readily be tinted to any desired shade or be given a pattern. Experiments are now being made which promise to correct its hardness and noisiness by mixing it with oil or with combinations of paper pulp or wood pulp. Before long we may have a cement floor which will be waterproof,

fireproof, dustproof, fairly elastic, pleasing in color, and permanent.

An old and worn floor can be turned into a sanitary one for several years by giving it two or three coats of paint, so as to fill all cracks and crannies, and then laying over it a cork carpet, linoleum, or thick oilcloth such as is used in hospitals. Frequent and regular washing, cleaning with a cloth or mop, and avoidance of the broom will reduce the floor-dust nuisance to a minimum on most floors.

Halls that waste space. The question of the hallways in school buildings is also a difficult one. Their floors are subject to even severer wear and tear than those of the schoolroom. Hence they are difficult to keep clear of dust. For hall floors, cement is the best material, as its hardness and coldness are of little importance here, and its noisiness can be largely overcome by a strip of rubber or linoleum laid down its center.

Waste of space in halls is also a serious defect. Their sole use is to provide a way into and out of the different rooms. On account of the square or block-shaped construction of some of our older buildings, as much as a fifth, or even a fourth, of the total floor space is wasted in hallways. This not only wastes space, but also causes difficulty in ventilation and lighting. Halls are usually near the center of the building, and consequently they are difficult to light properly and almost equally difficult to ventilate, except by making a chilly draft through them.

The modern type of school building tries to avoid the hall by building either in hollow squares around a central court, or in "T's" or "L's," or in the shape of the letter "E" surrounding three sides of the playground, with a central projection in the middle. In this way the buildings are nowhere more than one room and a corridor wide. By opening the windows in that corridor and the transoms over the doors, every room can get cross-ventilation straight through it, no matter what the direction of the wind.

Another disadvantage of the old-fashioned large hall was its noisiness. Being high, bare, and empty, the sound of feet upon its floor echoed through the rooms. The passage of a single class through it from one recitation room to another would disturb the whole building. Also, since it usually ended in stairs going down into the basement, any smoke or gas or odors from the toilets, cloak-rooms, or lavatories swept up through it, as through a chimney, and filled the whole building. In some of the newest school buildings, the corridors which connect the classrooms are simply roofed colonnades or porches, so that a class goes out into the fresh air every time it changes from one room to another.

Stairs that are easy to climb. Stairs in a schoolhouse should be broad, with low treads and gradual risers, so as to be easy for the shortest legs to climb. They should be made of iron and cement, or iron and glass, or some other fireproof material, and to prevent slipping each step should be surfaced with a

softish cement or with a rubber or cork mat. They should be well lighted, so that there shall not be the slightest danger of stumbling or missing the footing in dark corners or at badly lighted turns. They should be free from sharp turns or abrupt angles or square landings where two stairways meet.

These last requirements are largely on account of the fact that in most school buildings the stairs are depended upon as fire escapes. If they are made properly, and careful fire drills are practiced, they will empty a building more rapidly than any fire can spread through it, unless it has a tremendous headway. School buildings should be built entirely fireproof; but until they are, it is of the utmost importance that the stairways should be broad and well lighted, easy-sloping and free from dangerous angles or pockets. It is of great importance that all doors opening out from the foot of stairs should be made to swing out or swing both ways, and so constructed that the slightest pressure from the inside will unlatch or unlock them at once.

Keep the basement above the ground. The best basement for any school building is none at all. In the days when large quantities of wood and coal had to be stored away for the whole winter, and when lumber- and junk-rooms were considered necessary, there was some possible excuse for that half-civilized cellar called a school basement. Now there is practically none. If you feel that you must

Courtesy Russell Sage Foundation

THE SAFE KIND OF DOOR

Children are never burned to death in a school equipped with this kind of door. One touch on the "panic bolt" and the door swings open of itself to let the children out.

have a basement, grade the ground around it so that it will be at least half above ground level. There is plenty of room for the furnace, heating-plant, and a month's supply of coal in a fifth, or a fourth, of the space usually occupied by a school basement. The remainder offers a playground for rats, mice, and cockroaches, provides a place to keep things that should not be kept, and is likely to end in the installation of shops, lunch-rooms, and even class-rooms below ground level, where they should never be allowed.

Courtesy Bureau of Welfare of School Children, Dept. Social Welfare, N.Y. Assn. for Improving Condition of Poor, and Dept. of Education, N.Y.

WHY BASEMENTS ARE DANGEROUS

Oil-soaked brushes and brooms, rags and trash gather in them and furnish places for fires to start. This should not be allowed in a modern school.

Keep basement light and clean. If there is a basement, it should be kept just as clean and well ventilated as any other part of the building. This is partly for the same reasons that house cellars should be kept clean, and partly because of the likelihood of waste paper, old textbooks, and trash gathering in it. Nearly half the serious fires in school buildings, factories, and office buildings are due to a pile of paper, rags, floor sweepings, or other inflammable waste in some corner of the basement. A basement is the most dangerous place for a fire to start, for the same reason that we light a fire in a stove or grate by touching a match to the bottom of the pile of fuel instead of the top.

CHAPTER XIX

CLOAK-ROOMS AND CLOSETS

Toilets should not be in basement. Unless the toilet can be placed in a part of a basement where it will have plenty of light, and where the sun may enter freely during a considerable portion of the day, it is almost impossible to have it kept properly clean; and it is also difficult to ventilate. Although large toilets may be located in the basement, there should always be smaller toilets placed in outside or corner rooms, with good ventilation, on each floor of the building, for convenient use at all times except at recess and before and after school. Better still, the large toilets may be installed in a small one-story projection upon the ground floor.

Plenty of light and air. It is a hard matter, even with the most scrupulous care, to keep washrooms and toilets entirely free from odor. In fact, the only way to avoid offensiveness is to practice spotless cleanliness and make provision for the rapid escape of such odors as may be present and for abundant ventilation of every part of the room. The floors should be of cement, while the walls should be of some waterproof and washable material, tiled or slate-coated up to the height of five or six feet in and around the toilets and closets.

Light and cleanliness the best cleansers. A great variety of deodorizers and so-called cleansers have been devised to keep toilets and washrooms in a sanitary condition. Not one of these is of the slightest value as a substitute, first, for good construction; second, for cleanliness; and third, for light and air. In fact, most of them had better be dispensed with altogether, except certain forms of oils and paraffins which can be used to waterproof and make easier the cleaning of certain soiled surfaces. Most of these so-called deodorizers and cleansers do little more than add another offensive and equally unwholesome smell to those already present, and thus conceal these so that the necessary care is not taken to get rid of them by proper sanitary measures.

Matron in the cloak-room. It must never be forgotten that even the most perfect of sanitary appliances will not give good results unless the toilet-room is used in a cleanly, sanitary, intelligent manner, and constantly watched in order to prevent the beginning of any souring or putrefaction of soiled surfaces. It is best to have toilet-rooms patrolled at regular intervals throughout the day, either by the janitor or matron, to prevent uncleanliness and to detect offenders against good manners and cleanly, decent habits.

In our crowded centers, the school washrooms, cloak-rooms, and toilets are educational factors. Habits and standards may be formed there which will be carried into the home and raise the general

living standards of the whole community. The aim of the schools should be to lead in these matters by establishing a standard of cleanliness, hygiene, and conduct which is just a little in advance of that of the community in which it stands. In the larger schools it is a very good plan to have a matron in attendance in the cloak-rooms, both on the girls' side and among the younger boys.

Another feature which ought to be made a regular part of every schoolhouse, except the smallest and most simple, is a bath with hot and cold water. In crowded districts where many of the tenement homes have no proper bathrooms, these baths should be numerous enough to provide every child in the school with at least one and preferably two baths a week. These should be taken in school time. This is a regular institution in many of the best English and Continental schools. It is also an excellent means of enforcing standards of personal cleanliness. A boy or a girl inclined to be untidy or slovenly in personal habits will profit by the hint when sent down by the teacher to take a bath. During the lunch hour or after school those who cannot have a comfortable warm bath in their homes may be allowed to take one in the school, either free or on the payment of a small sum for towels and soap.

Sterilizing-closet for clothing. All cloak-rooms should have at least one window opening to the outside, and preferably two or three. The habit of using a dark end of the hall or an airless dark

ante-room partitioned off from the schoolroom is bad.

The cloak-room should be well lighted and well ventilated. In a furnace- or steam-heated building, it is well to have a stream of hot dry air driven rapidly through the clothing whenever the children have come to school in the rain. In crowded schools where some of the children come from crowded districts, it is a good thing to have a small sterilizing-closet, in which clothing which is suspected of being infected can be hung and sterilized by steam or formalin.

Rest-rooms with cots. Every school, even the smallest in the country districts, should be provided with a rest-room large enough to contain a cot or lounge, upon which children who become tired or are suddenly taken ill can be made comfortable until they recover or can be taken home. It is also an excellent place to put the small children who go to sleep over their lessons in the middle of the morning. Some children have to walk a considerable distance to school and are so tired by the time the midday recess comes that they need a nap after they have eaten their lunches. Provision for this in the rest-room will improve the quality of their afternoon school work as well as protect their health. It should also be a standard of school conduct that whenever a child feels tired enough to want to go and lie down, he should be permitted to do so without having to give any reasons or letting his request become public.

CHAPTER XX

PLAYGROUNDS AND SHOPS

The pleasantest part of the schoolhouse. The playground is the pleasantest and one of the best parts of the school plant because it is the healthiest. Nothing will ever repay us in after years for not having good health in childhood. We can learn all through our lives, but the ten years from five to fifteen are the time when we can grow to best advantage.

The most progressive schools are beginning to make the playground a larger and larger part of the course of education. The city of Chicago, for instance, in recent years has insisted upon procuring at least five acres of ground for each new school site purchased. The school authorities in Gary, Indiana, began with two acres for their first school, then provided five acres for their second, and fifteen acres for their third school; and every foot of ground is used in their scheme of education.

The more we learn on the playground, the less time we need to spend in the schoolroom. A school building, with large, well-equipped playground and shops, can accommodate twice as many children as the old-fashioned schoolhouse of its size used to hold, because half of them are in the open air, or at

work in the shops, while the other half are in the classroom.

What we learn at play. We recognize to-day that some of the most valuable lessons we learn in our lives are those learned on the playground. In the first place, the playground is the only place where we can learn to control our bodies; to become swift and sure of foot; clear and certain of eye; strong in wind and limb; able to catch and to throw and to balance, to take care of ourselves and to protect others. A quick eye, a steady hand, good judgment, and grit are far more important to success in life than grammar or algebra or Latin.

On the playground we learn to work with others; to take our place in the team; to put the success of the group above our own vanity or pride; to control our tempers; to bear pain and fatigue and hard knocks without wincing; and to play fair. We are taught a great many things about conduct and goodness by word of mouth or out of books, but the code of morals that we are likely to live by is the one we learn on the playground.

How play helps study. If you have an hour in which to get a lesson, the most economical way to do it is to spend a part of that hour in play, unless you are very tired, when sleep is better. It matters little whether play comes in the first part or the second part of the hour. If you take the play first, it will rest your eyes and tune up your muscles until the work will seem like play to you. If you do your

work first and take your play as a reward, you will be so eager to get out to play that you will work hard and finish the task before you know it. It is the opinion of scientists, teachers, and doctors that if children —and grown-ups as well — spent in play or sleep about half the time now spent in work, more and better work would be done with less injury to health.

It is astonishing how fast your brain will work when you are well fed, well exercised, and well rested. The aim of education now is to alternate work and play, exercise and rest, so that all our important work will be done when we are in the best possible condition to do it.

What fatigue means. Fatigue, or tiredness, is not just laziness, but a poisoned condition in which our nerves and our muscles, our brains and our lungs are full of the waste products of our own activities. The only way to get rid of these poisonous waste products is to lie down and sleep, or to change our occupation, preferably for play or pleasant work in the open air. If we keep on driving ourselves in spite of this poisoned feeling, we shall get little more work done. What little we do will be of poor quality, and what we try to learn when in this condition, we shall soon forget. In every kind of work our aim is to stop just short of actual fatigue. The more important the work is, the more necessary is this rule. By changing to some occupation in the open air, our lungs have a chance to burn up these poisons. In

half an hour or an hour we can come back fresh and go at our work again with redoubled energy.

Another advantage of alternating study with play and with work in shops is that we learn not merely with our eyes, ears, and memories, but also with our hands, feet, muscles, and sense of touch. We are taking in information from all five of our senses instead of from only two or three of them, as when we work at a desk in school.

Play-places in wet weather. The Greeks had the finest schools the world has ever seen. They were all playgrounds and open porches. Half their world-famous lectures, debates, and dialogues were given in the open air. They had the advantage of the beautiful Mediterranean weather, with bright sunny days practically ten months of the year. In our harsher, stormier climates, we have to make provision for rain and snow; and it is therefore most important that every school playground should have one or more large covered play-sheds. These should be without walls, or have a wall on only one side. Movable shutters, window sash, or curtains can be drawn on the side toward the wind to keep out the rain or snow. With such a shed, active, lively play can be carried on in the open air practically twenty-nine days out of every month in the year.

If the open ground on which we play is dry and well-drained, a little moisture or snow in the air won't hurt us a bit. It is most important that the surface of the playground should be covered with

small gravel, finely screened ashes, clean, sharp sand, or other porous material, and carefully graded, so as to shed the wet all over its surface. It should be well drained at its edges and by tiles two or three feet below the surface. Then there will be no danger of puddles forming or mud being trodden up even in the wettest weather.

The swimming-pool. A swimming-pool ought to be a standard part of the equipment of every school which can afford it. Swimming is not only one of the best exercises, but it is a great help toward keeping our bodies clean and vigorous, and a practical accomplishment of great value, as it may enable us to save our own life or that of another. The actual number of people drowned, except among fishermen and sailors, is comparatively small, but we never know when we may be in that danger. Now that travel is becoming so much more frequent, it is a satisfaction to feel that we can take care of ourselves in the event of an accident on shipboard or on the pier. One of the greatest values in knowing how to swim is that it enables us to keep our heads in time of danger, because we have this resource. It should be a part of every child's education; and in every town with a public system of water-supply, it is a simple matter to make a swimming-pool. The only important expense is digging and lining the pool with cement, and this is by no means excessive.

CHAPTER XXI

THE SCHOOL DOCTOR AND THE SCHOOL NURSE

Keeping fit for work. An engine may have a fire under its boiler, a good head of steam, and its fly-wheel, shafts, and gears in perfect condition; yet, if a little grit finds its way into one of the bearings, the whole thing breaks down. In the human machine, one of the most important things to guard against is getting dirt into its bearings. The most dangerous form of that dirt is germs. The workers of a nation lose a great deal of time through unemployment by the failure of crops, the burning of factories, panics and failures in business, but by far the greatest loss of time in human working power is that caused by disease. On an average we lose about fifteen or twenty days every year by sickness. It is well worth our while, therefore, to give intelligent attention to the best ways of avoiding those tiny dirts which get into our bodies and make trouble.

The stitch in time. We have all heard of the stitch in time that saves nine by holding the gaping edges of the little tear together and keeping it from spreading. That is exactly what we should try to do with the infectious diseases. Fortunately, most of them are comparatively mild, and if taken in time can be so handled as to be almost harmless to

ourselves and to others. But if we neglect even the mildest of them, such as an ordinary cold in the head or a sore throat, it may develop into serious trouble which may leave scars upon our hearts or kidneys or lungs and injure us for life.

Saving ourselves and protecting others. If we know early that we have one of the mild infectious diseases, as measles or chicken-pox or tonsillitis, or even a common cold, we should stay in our room and avoid infecting others. It is quite as important to keep from spreading disease as it is to save ourselves from a serious attack. Fortunately, the rest in bed which will help nature to cure us most quickly is also the method which best prevents us from infecting anybody else.

The school clinic. It has now become customary in most of the larger city and country schools, where many children are brought together, to have a school doctor or school nurse, or both. They come in frequently and look over the children quickly, to see whether any of them show signs of being sick or out of sorts. When children are found with flushed faces or headaches or coughs or sniffles, they are either sent to the rest-room to be made comfortable or sent home and advised to call the family doctor. Often the nurse will go home with the children to see whether any other members of the family are sick and make arrangements to have them taken care of promptly. If the trouble is due to a cut finger or a bruised head or a chronic sore throat or some form

of skin disease, the pupil is taken to a room in the building provided for the purpose, where the nurse dresses, bandages, paints with iodine, rubs on salve, or does whatever may be necessary.

Vacation schools in the country. Some city schools now buy a small farm in a pretty, healthful part of the country five or ten miles out of town, and build there open-air schoolrooms with sleeping-porches, dormitories, sheds, shops, and big barns. School children who are out of health or are not growing properly, or who can't find a place to play in the crowded city, are sent there for two weeks or a month or three months. Often children who are not making proper progress with their studies or in their growth, because their blood is poor or their hearts are weak or their digestions are out of order, will come back from a stay in this open-air school rosy, strong, hearty, and ready to make up two grades in a year. These school farms are also used in the summer time as vacation camps for all the children. Squads of ten to fifty at a time race across the fields, climb the trees, swim in the creek, and roll on the grass. They learn about birds, flowers, animals, farm work, food-supplies, and life in general, even if they do not do much book work.

Eyes and ears. The two parts of our machinery which are most likely to break down in the schoolroom are our eyes and our ears, because they are in such steady use. Partly for that reason, the beginning of sickness shows itself in them very quickly.

As soon as the germs have swarmed in millions all through our blood, so that we begin to be feverish, our eyes begin to feel hot and tired, and to look red and swollen. When your eyes begin to smart and water and it is an effort to see the letters on the page, it is a good time to take a rest. If that does n't make them feel better, go to the school doctor and tell him that you don't feel well and let him find out what is the matter. If your ears begin to buzz and feel stopped up and uncomfortable, you are probably getting a cold in the head or throat which is spreading to your ears, or you are beginning to have a fever. Again, it should be a sign to stop work and go to the doctor or nurse, or to your mother, if you are at home, for treatment and care.

One of the important things to consider in a schoolroom is its hearing properties, or *acoustics*, as the scientists call them. Words spoken by the teacher or the class in an ordinary tone of voice, such as is used in recitation, should be heard everywhere in the classroom. If any pupil finds it difficult to hear the teacher from his seat, he should report it at once, so that if others find the same difficulty the teacher may make the necessary changes in doors or windows, or have a screen hung from the ceiling to make herself heard in every part of the room.

If, on the other hand, no one else has difficulty in hearing the teacher, there probably is something wrong with the hearing of the pupil who fails to understand what she says, and the school doctor or

Photographs by Mary H. Northend

THE SUMMER CAMP AND VACATION SCHOOL

It is just as important to learn to swim and ride and play wholesome out-of-door games as it is to learn things in books. Summer camps and vacation schools teach boys and girls how to grow up into strong, healthy men and women.

school nurse should be called in to see what can be done to improve the hearing. This is very important. In childhood nine cases of deafness out of ten can be almost completely cured by proper treatment. In fact, it has been found that many children who were supposed to be stupid or careless or inattentive were merely unable to hear what the teacher was saying; and as soon as their hearing was improved they quickly became good students.

The commonest cause of deafness in children is some form of chronic catarrh in the nose and throat, and particularly a spongy swelling and inflammation of a little gland like a tonsil, which lies just at the back of the nose and in the roof of the back of the throat. This little spongy, glandular body may become swollen and enlarged until it is as big as a large blackberry. It then blocks up the back of the nose, making it hard to breathe through the nostrils and may press upon the little tubes which run from the back of the throat to the drum cavity of the ear to supply the drum with air, and set up inflammation there. When these little tubes become blocked up and swollen, the drum of the ear becomes thickened and inflamed, and the little patient becomes hard of hearing or quite deaf. These spongy growths are known as *adenoids*. Fortunately, a slight and almost painless operation will remove these adenoids, completely curing the obstruction of the nose and the deafness at the same time. You can recognize children who suffer with adenoids by the ex-

pression of their faces. Since the nose is blocked up, they have to open their mouths in order to get enough breath and so become what we call "mouth-breathers." Going about with their mouths open all the time gives their faces a vacant, stupid expression. Since their nostrils are not used properly to breathe with, they do not grow as they should, the sides of the nose sink in, and the nose looks pinched and blocked up.

Noses and throats. The commonest place for trouble to show itself first is in our noses and throats. Many of the germs which cause disease are breathed in and lodge first on the sticky ventilation coils in our noses or in the hollows about our tonsils and in the back of our throats. Cold in the head, sore throat, measles, scarlatina, and whooping-cough often begin with a slight headache, closely followed by a feeling of swelling and stickiness and soreness in the throat or of stuffiness and tickling in the nose. Nine times out of ten when you have these uncomfortable feelings, it means that you have caught some mild infection, and you should go home at once and keep yourself comfortable, well ventilated, and at rest until you are well. You will gain nothing by trying to work in this condition, because you can't fix your attention properly on the lesson. While it is not a pleasant thing to be sick, even in the mildest way, there is nothing to be uneasy about if your head begins to ache and your throat feels a little stiff. Almost everybody has one

or more little attacks of this sort every winter. Ninety-nine out of a hundred of them will quickly get better of themselves within three or four days if you go home and keep perfectly quiet and rest in good, pure air.

Rashes and pimples. In sickness where there is fever, the body is hotter than it should be. The face becomes somewhat flushed, because the heart is pumping the blood out to the surface of the skin to cool it off as quickly as possible. In some of the milder diseases, like measles or chicken-pox, this redness of the skin goes deeper, and little blotches or mottlings or spots of various kinds appear upon it. These are known as a rash or an eruption. Such a rash is practically always the sign of some form of infectious disease, and it is well to keep away from any one who shows signs of it. If a rash is not caused by sickness or fever, it is likely to be some local skin disease. Many of these are infectious, and all of them are disagreeable. If you were old enough to nurse and take care of your playmates, it would not be right to keep away from them when they look or are sick. But until you are grown up, you can do them no good, and may do yourself a great deal of harm by talking or playing or sitting with them, besides possibly carrying their infection to others.

There is no need to be anxious about the possibility of catching these diseases, but they should be avoided as far as possible. If you will use your eyes and keep away from children who have flushed

Courtesy Russell Sage Foundation

SCHOOL NURSE AND DOCTOR AT WORK

faces and heavy eyes, or a cough or the sniffles or a rash or eruption of any kind, you will avoid many of the infections called "children's diseases." These diseases are almost always spread by children; and it needs only a little watchfulness and intelligence on your part to avoid most of this risk.

How diseases spread. You will not catch these diseases in the street by passing children suffering with them. You are not likely to catch them even if you sit at some little distance from the sick children in the same room. Usually it is necessary to touch them or their clothing or their pencils or their candy or something which they have had in their hands or mouth before you will catch the disease. For this reason it is best not to exchange books with other children, especially if they look or have been sick. In many schools and in most libraries all books are disinfected by fumigating with formalin or sulphur gas every month or so. The habit of moistening the finger in the mouth in order to turn over the pages of a book should be avoided, especially if the book is old and the pages dirty. You should never on any account borrow pencils in school or lend yours. Many children have the habit of chewing the blunt end of their pencils, or putting the point in their mouths to make it write darker, or from nervousness. If they happen to have in their mouths the germs of a cold or a sore throat or measles, these are left on the end of the pencil, and will be licked off by the next youngster who goes through the

same foolish performance. You should always avoid putting the end of a pencil in your mouth. The best practical way to do this is to use a very soft pencil — No. 1 or No. 2 — so that you will not be under any temptation to wet it in order to make it mark black enough.

Towels are also a source of dirt and of danger, because in wiping the face and hands you are almost certain to get a little of the moisture from your lips or nose on them. The roller towel should never be used. Every child should either be provided with his own towel to be kept in his desk, or there should be large piles of small hand towels like those used in hotels and Pullman cars, so that each child can have a clean one each time the hands are washed. If this is considered too expensive, a roll of paper towels may be hung up, from which a fresh sheet can be torn each time. Paper towels are not as pleasant to the face as cotton or linen, but they are just as good for the hands, and have the great advantage of being perfectly clean, safe, and inexpensive.

SECTION IV — HOW THE COMMUNITY HELPS US

CHAPTER XXII

PURE-FOOD LAWS AND FOOD INSPECTION

All foods pure as they grow. In the days of our grandfathers, when almost everybody either lived on a farm or in small towns or villages, there was not much need for laws about pure food or for food inspection. Most people had room for a vegetable garden, a barn, and a chicken-house, and they raised their own vegetables and fruit, and produced their own milk, eggs, and butter. Most of the vegetables were brought directly from the garden into the house for immediate use or for storage. The eggs were used as fast as the hens laid them, and the milk was brought into the pantry still warm and foaming in the pail. Even though dirt and dust and germs might be in the milk or on the vegetables, the bacteria did not have time enough to grow and cause much decay before the food was eaten.

What causes food to spoil. As we have already seen, the principal things which cause foods to spoil and become unwholesome are germs — bacteria and molds. These germs grow at an extraordinarily rapid rate, especially when they have both

moisture and warmth. A few hundred bacteria in a pan of milk will increase to several hundred thousand within twenty-four hours, and to several millions within forty-eight hours.

Although we should have all our food as nearly clean as possible, yet we have become used to small amounts of dirt and germs in our food and can manage to digest them without serious trouble. Unless the germs have had from one to four days to grow, or have been thrown into the food in large amounts, they cannot raise an army big enough to attack our stomachs and do us serious damage.

Keeping foods clean in wagons and trains. At the present time nearly half of the people in the United States live in cities of more than eight thousand population, which means that less than a third of us are able to produce our own vegetables and fruit and milk and eggs. Consequently, most of our foods have to be shipped long distances by rail before they come into our markets, and then often make two or three shorter trips from the commission merchant to the wholesale dealer, and from him to the retail store, before they reach our kitchens and tables. In addition to this, since railroads have been built and transportation is fast and cheap, we bring fruits and vegetables thousands of miles, from warmer climates in our own country in the early spring, and from hot countries in the winter time. Unless these foods are carefully handled and protected, they may gather dirt and infection during the days or weeks spent in

transit. Therefore it is necessary to have laws providing that every care be taken to keep them clean during their journey, and that inspectors be paid to go backward and forward from the docks to the railroad stations, the trains and the steamships, the markets and the shops, to see that these laws are obeyed.

Fortunately, most dirt or careless handling which makes food unwholesome to eat also makes it disagreeable to look at, and hence difficult to sell for a good price. Naturally those who ship and handle food are usually anxious to keep it as clean, cool, and free from dirt and germs as possible. Most of the railroads and big food-shipping firms have special cars built, which are not only absolutely clean and dust-tight, but are often provided with special systems of ventilation to keep the food cool and fresh. For shipments of fruits, vegetables, and fresh meats, they are provided with ice and fitted up as refrigerators. Foods can be carried to-day a thousand miles with less soiling and spoiling than they used to receive in ten miles of joggling in a peddler's dirty cart, exposed to dirt, dust, and sun.

Keeping food clean in storage. Another difficulty is that food is shipped into the big railroad centers from such long distances and in such great quantities that often far more piles up there than people can eat at once. This surplus food used to be held until it was just beginning to spoil and there was no chance of selling it direct to the consumer. Then it was sold at a low price to peddlers and pretended

THE MEAT INSPECTOR

Condemning spoiled meat in a market, and putting a chemical on it which will prevent any dishonest butcher from selling it to any one.

farmers or market gardeners, who hawked it around in their wagons. This was a great waste, both for the farmers who grew it and for the housewives who bought the decaying stuff because it was cheap. In recent years food shippers have erected huge cold-storage warehouses, fitted up with racks and compartments in which vegetables, meat, eggs, butter, etc., can be stored, and where the air is chilled below freezing-point to prevent germ growth and keep the foods from spoiling.

In these cold-storage warehouses vegetables, fruits, and meat may be kept without spoiling, not only for weeks, but even for months and years. Indeed, the food dealers were so delighted with the way they could keep foods in these great ice palaces that they began to crowd in everything which they could not sell at a good price, and hold it until prices went up again. But it was found that, although foods could be kept in cold storage for a very long period without actually decaying, when they had been kept several weeks or months they had a disagreeable flavor or a flat, pasty appearance after they were thawed out. Dealers and health inspectors alike are agreed that it is bad to keep foods in cold storage for more than a moderate length of time. Moreover, if foods are already beginning to spoil when they are put in cold storage, the cold cannot cure the decay which has already taken place and the spoiling slowly continues until they become unfit for human food.

Food which is to go into cold storage should be carefully inspected by the health officers or food inspectors, and any which shows signs of spoiling should be condemned at once. On the whole, cold storage, if honestly and cleanly conducted, is a great benefit to both the community and the food dealers, enabling foods to be kept fresh and sweet, and also to be stored away when they are abundant and cheap and kept for seasons of scarcity.

Of course, no food should ever be stored except in compartments which are not only strictly clean, but well lighted, well drained, and well ventilated. If cellars are used, they should be provided with windows all around the top for good ventilation. If the light from the windows is not sufficient, the cellars should be equipped with electric lights. They should also be well drained and furnished with stoves, furnaces, or other means of thoroughly drying the air at regular intervals between the periods when they are used for storage. This is necessary to kill molds and germs. Since the invention of the cold-air chamber, there is little excuse for permitting foods to be stored in cellars.

Inspecting foods in markets. After food has been grown, gathered, packed in a cleanly, careful manner in clean crates and boxes, and shipped in a well-cleaned and ventilated car, — better still, a refrigerator car, — it usually goes to some commission house or market. Here it is opened and exposed for sale to the grocers. Usually this is the opportunity

for a thorough examination by the food inspectors of the health department. Any food which is in bad condition or decayed is condemned as unfit for human food. The sound food is passed and frequently marked with a tag or label or stamp, showing that it has been examined and found to be pure. Usually the date of the examination is added. The food which is condemned is loaded at once into carts by city employees and carried to the city garbage crematory or dump. In some cases kerosene is poured over the condemned products so that they cannot be sold as food, and the owners are ordered to dispose of them by burial or otherwise.

This seems like a harsh procedure, but it has been found that if it is not insisted upon, the condemned food will be slipped out by a back door and sold to some dealer to be canned, peddled in the poorer parts of the city, or used by cheap restaurants for stews and hashes. No butter or eggs can be in such vile condition that they will not be eagerly bought and used by some baker or other person. The famous label devised by a practical joker to be hung on the egg-basket at the grocery store, "Rotten eggs, good enough for custard," was not by any means a mere flight of imagination. In fact, one of the bitterest fights which boards of health have had with food dealers all over the country is to determine just exactly how rotten eggs may be allowed to be for legal use in the making of different grades of cake, custard, and confectionery!

Every imaginable trick is practiced to evade this inspection of food at the wharves, freight stations, and markets. It seems to be a point of pride with food dealers to sell every scrap of food which has spoiled on their hands — for some price — to somebody — regardless of the consumer's stomach. That much-abused dish called hash makes the use of these food remnants easy; for onions will kill almost any odor except their own.

Keeping food clean in shops. After food has passed inspection at the markets, it is bought by the retail dealers and delivered to the butcher shops and grocery shops. Here it meets a new source of danger from dirt and dust, because it is considered necessary to display it in as lavish and attractive a manner as possible, in order to catch the eye of customers. The food is exposed to flies and to the dust and germs that may be in the air of the shop, that may be brought in on the feet of customers, or coughed or sneezed into the air by them. Moreover, the store cat rummages the garbage-cans and prowls the roofs all night, and wanders about among the cucumbers or sleeps in the barrel of dried beans all day.

This display of food is dangerous enough when vegetables are shown in the shops, but when they are arranged in banks out on the sidewalk against a wall or window, and even in tubs on the curb itself, it becomes most unwholesome and insanitary. All the dust of the street, the things which are shaken or blown from passing wagons, and the hairs from

stray dogs are sifted into and through the food, while the smoke and soot settles on it undisturbed. This risk is being abated, partly by the insistence of health officers and food inspectors, partly by the pressure brought to bear by committees of women's clubs and other public-spirited organizations, and partly by the shopkeepers themselves. All kinds of dry food, such as crackers, cookies, sugar, beans, peas, and macaroni, which used to be exposed in barrels, are now put up in neat packages protected from the dust. Pickles, preserves, and salt meats, instead of standing about in open kegs, are put up in attractive glasses or tins. Fruit baskets and boxes are fitted with inexpensive celluloid or glass or paper covers. Vegetables and fruits in bulk are displayed in spotless glass cases with swinging or sliding sashes. Sidewalk displays are forbidden or limited to certain comparatively dust-proof products, such as potatoes, turnips, and carrots, which are peeled or washed and boiled thoroughly before being used. These glass cases, celluloid covers, wire screens, etc., cost a little money and some trouble in the beginning, but they pay for themselves in the long run, because the goods keep so much better behind them.

Inspecting bakeries, restaurants, and hotels. When the law has protected the food in its public course from the farm through the shop into private kitchens and pantries, it follows no farther. Each household is supposed to have a right to poison

THE RIGHT KIND OF BAKERY

itself if it so pleases, and is willing to suffer the consequences. It is assumed that our own self-interest will make us handle, cook, and serve our food in a cleanly, sanitary manner. This is usually true; but unfortunately there are some exceptions, and a thorough inspection by some competent sanitary authority of private kitchens, pantries, ice-boxes, and cellars about twice a year would greatly benefit public health. The time has not yet come when we will permit inspection of our homes by experts, and so boards of health confine their attention to hotels, bakeries, markets, and restaurants.

There is a wide field of usefulness here. Most individuals conducting such establishments wish to provide clean food at fair prices. But there are many ancient trade customs which are anything but sanitary. As individuals, the baker or hotel-keeper would be ashamed to practice them; but in the trade everybody does it. Curiously enough, all these trade customs are in the interests of the dealer, and against those of the community. For example, it is one of the traditions of the bakery trade that a bakeshop should be in a cellar. This custom began probably in a desire to get a cheap rent and to economize fuel by preventing loss of heat during the hours when the oven must be kept at high baking temperature. A cellar is always dark, usually ill-ventilated, often damp, and certain sooner or later to become dirty and insanitary. For this reason most cities with modern health departments have found it nec-

essary to pass laws forbidding the use of cellars or other underground chambers for bakeshops.

Another matter which must be carefully watched is the use of unwholesome eggs, butter, and milk by bakers, and of decayed meats, vegetables, and fruits by the keepers of hotels and restaurants.

Hotel and restaurant kitchens are often placed in cellars or basements. In addition to the same insanitary conditions of lack of light and bad drainage which make cellars so undesirable for bakeries, it is almost impossible to cool and ventilate these rooms properly, so that the large force of cooks, scullery-men, dishwashers, waiters, and other employees are obliged to work under unhealthful conditions. These conditions make them particularly liable to catarrhs and consumption, and the germs which they cough or sneeze into the air are likely to be mixed with the patrons' food. The heat often keeps the workers in a drip of perspiration, and that perspiration is likely to drop into the food. The proper place for a hotel kitchen and dining-room is in the top story instead of the basement. This insures good light, air, and ventilation, and prevents the smells of cooking from rising through the rest of the house.

Bad things added to foods. Another health danger which food inspectors must watch is the addition of various substances to foods to make them keep. to improve their appearance, or to increase their bulk. These added substances are usually either

hard to digest or actually poisonous to the stomach. They are called *adulterations*, and are sometimes a source of serious danger to health.

Some of them, although frauds, are comparatively harmless. For example, some canning companies substitute apple juice or tomato pulp for strawberries, raspberries, currants, and the more expensive fruits, in jams and jellies. Red pepper is substituted for ginger in ginger ales. A dried root called chicory, or browned corn, or beans, or peas, is sometimes ground in with coffee.

Other adulterations are very dangerous to health, such as the use of copper to give a bright green color to canned peas, or of red aniline dyes to make catfish look like canned salmon, or the mixing of bad gelatine with fruit juices to make jelly. The most dangerous adulterations are strong chemicals called *preservatives*, which kill the odor and cover up the appearance of spoiled or decaying meats in the preparation of canned or bottled goods, or in dried meats. The amount of adulteration ranges all the way from mere traces of the substance up to such works of art as the production of egg powders without a scrap of egg in them, or sausages made of bread, corn-meal, and floor scrapings from the slaughter-house, or potted chicken made of diseased veal.

CHAPTER XXIII

PURE WATER AND ITS SUPPLY

Clean water comes down from the clouds. Like food, all water is clean and pure "where it begins." When it comes down from the clouds in the shape of rain, it is almost entirely free from germs. Most of the things that happen to it after it touches the ground do little to make it impure until it comes in touch with man or some of his works.

As we have already seen, we are to blame for most of the contamination of our drinking-water. Most of the rain that falls on the surface soaks a little way into the soil, gradually drains down the slopes into the brooks and creeks, through these into the rivers, through the rivers into the lakes, or into the sea. If we want to drink it, we collect it at some one of these points in its course to the sea.

What happens to the rain before we drink it. In early times camps, forts, and villages were built on the banks of streams so as to have a supply of water. Many farmhouses were placed near a brook or spring. Later, as the country grew more thickly settled, every house could not have a brook or spring of its own, and we began to dig holes in the ground, called wells, to catch rainwater as it soaked down through the surface soil.

These shallow or surface wells were dug near the house and the barn for convenience in supplying the kitchen and the stock. Consequently, dirt was washed into them from the back yard, the barn-yard, and the privy vaults, and the water became unfit to drink. Farmhouses may arrange and grade the land about their wells so as to avoid this danger, but as soon as houses began to be built side by side along streets, with only a narrow alley separating them from another row facing on the next street, it was almost impossible to place a well so that no form of dirt or refuse could be washed into it. In all the downtown districts of cities the use of well water for drinking purposes is absolutely forbidden, though it may be used for manufacturing purposes other than washing or the preparation of food.

Artesian wells and reservoirs. To take the place of these wells, the city is obliged to catch the water at another stage of its course toward the sea, — that is, in some stream, river, or lake, — bring it through a pipe-line into the city, and carry it in branch pipes down each street. Sometimes a good supply may be secured by boring deep wells down through the earth and rocks until some underground sheet or stream of water is struck. This has usually filtered through the soil for long distances, and is pure. It can be pumped into a reservoir and held for distribution through the city. In some cases this water has run down into this underground hollow from

hills or mountains many miles away, and is under such pressure that, when the boring drill taps it, it will rise up through the shaft to the surface, or even spout up ten or fifteen feet into the air. Such wells are known as *artesian wells*, because they were first discovered in the province of Artois, in France.

More commonly, however, the water of some river or lake is pumped into the city pipes. If the river or lake be large enough, a chamber or box with porous walls or openings covered by gratings to keep out mud and weeds is built on the bottom of the river or lake, out where the water is deep. The intake pipe starts from the bottom of this chamber, and the water is pumped through it into a reservoir or filter tanks, or directly into the water-pipes or mains. This chamber at the bottom of the lake or river is called a *crib*, or *water-crib*.

If the stream or lake is not large enough to afford plenty of water through the entire year, a dam is built across it to form a reservoir. For the sake of water and boat traffic, most of our large cities were built on the bank of a river. In earlier days the water-supply was taken from these rivers, but as the country has become thickly settled, many houses, factories, small towns and villages have been built along their banks, and the waste draining into the rivers has made them too polluted for use as a direct water-supply. Consequently, it has become customary for our larger cities to secure their water-supply from some lake or river a considerable

distance away in the hills or mountains. If there is no large lake or river within reach, the city builds a huge dam across the whole valley of some mountain stream. This turns the region into a lake. Living or camping on the slopes which drain into the lake is forbidden, so as to keep the water perfectly pure. The city of New York, for instance, built, not long ago, a huge dam in the Ramapo region of the Catskill Mountains, which formed behind it a huge reservoir of 36 square miles and held back the water from an area of over 200 square miles. All this land was purchased by the city and the buildings upon it torn down, which necessitated removing three or four villages and hundreds of farmhouses.

Aqueducts. The water from this huge Ashokan Reservoir is brought to the city through a great aqueduct nearly a hundred miles in length, which dips under the Hudson River, and siphons up again on the other side. It is large enough to supply 500,000,000 gallons of water a day to the great city; the city must have plenty of water to drink and keep clean with — otherwise it would stop growing.

Other cities are spending even larger sums of money in proportion and undertaking equally difficult feats of engineering to get a proper supply of water. Los Angeles, for instance, has built an aqueduct to bring water from the Owens River Valley, two hundred and fifty miles away, and eight thousand feet high among the Sierras. In its course, it tunnels through three different mountain chains. It

cost over $24,000,000, but it will be a splendid investment, because, on account of its tremendous fall, it will supply not only water, but immense electric power, and a surplus for irrigation as well. Even without power, cities now find that they can afford to pay well for an abundant supply of perfectly pure water. A moderate water rent will return good interest on the investment.

Filter beds. Other cities, which are situated near rivers or lakes whose water is liable to become impure, and which have no hills or mountains within reach, can get a perfectly wholesome supply of water by putting in reservoirs and filtration plants. These filter plants are usually huge settling-basins and great beds of sand and gravel, through a series of which the water is allowed to soak before it reaches the tank or reservoir from which it is pumped over the city. They cost a good deal of money to install, but not so much as a fifty-mile aqueduct. If carefully watched and intelligently operated, they will give a reasonably safe and wholesome supply. They need close inspection by the health officials, because, especially during floods and freshets, the filters are likely to become clogged by the mud and silt in the water. Then, rather than let the city run short of water, the engineers will sometimes pump unfiltered water into the mains. When this happens, an epidemic of typhoid is likely to follow.

How typhoid spreads. We have already seen that typhoid fever is caused by the infection of the milk

or water or food-supply of well persons by the discharges from the body of a typhoid patient. When typhoid discharges, or sewage infected with them, get into the reservoir or stream supplying a town or city, the drinking-water of several thousand people is infected. It is astonishing how comparatively small an amount of typhoid matter is sufficient to infect a whole water system. Again and again the drainage from a single house in which was a case of typhoid fever has infected a whole city. In one case a single family with typhoid fever, who camped for a few days upon a slope draining into a reservoir, produced an epidemic of over two thousand cases in the city which used the water. For this reason the whole watershed draining into the basin of a reservoir or lake has to be watched and guarded constantly to see that no infection of the water occurs from diseased human beings or diseased cattle.

Our typhoid death-rate is going down steadily, because we are becoming more careful about having clean water; but it is still far too high. On an average, it is much greater than that of many European countries. We still lose yearly by typhoid fever in the United States over twelve thousand lives, at least three fourths of which could have been saved.

Other water-borne diseases. While typhoid fever is the most serious disease borne by water, and the most readily traceable to its source, it forms only a

small part of the damage done by impure or dirty water. There are several diseases of the stomach and bowels which are carried in polluted water. Even though the drinking-water may not contain the actual germs of infectious diseases, the presence of sewage, factory waste, and decaying vegetable matter may make a great many people sick. Whenever a city or town, to reduce its typhoid, puts in a supply of perfectly pure water, not only does its typhoid death-rate drop very much, but its general death-rate from other causes is lowered as well. For every death by typhoid prevented, three deaths from other causes are also avoided.

Home treatment of water. If for any reason the city authorities cannot be awakened to their duty to provide a pure water-supply, or from some accident the filter beds get out of order, we can still protect ourselves by boiling all the water that we use for drinking or cooking purposes. While this of course will not make dirty water clean, it will at least kill all the germs in it and stop it from infecting those who drink it. There are a variety of filters manufactured and sold for use in the home, but few of them are satisfactory or safe for practical purposes. Those that are attached directly to the faucet and allow the water to pass through quickly are little better than frauds, for all that they do is to strain out the big dirt and let all the really dangerous dirt and germs in the water pass through.

CHAPTER XXIV

SEWAGE AND GARBAGE DISPOSAL

How we may poison ourselves. Every house, barn, shop, factory, and place where men live and work gathers heaps of waste, dirt, and fertilizer, which, if not regularly removed and burned, will decay and become offensive both to the eye and to the nose.

Still, this dirt will do us no serious harm unless it gets into our drinking-water or our food. A few unpleasant odors hurt nobody, if the substances from which they come are rapidly decaying and entering into the soil — as in the case of garden or lawn fertilizers — or are to be removed and destroyed before flies and other insects have had time to breed in them. We need not hesitate to use strong-smelling and disagreeable fertilizers and dressings upon our lawns and gardens, if there is no danger of their getting into our water-supply, or of their being blown into our houses and kitchens in the form of dust. Stable manure, for instance, is dangerous only as it gathers in heaps large enough to be moist in the center and to serve as the breeding-ground of flies. Waste and fertilizer, when spread thinly over the surface of the soil, rapidly become harmless and inoffensive.

How nature takes care of sewage. In fact, nature's method for making waste and dirt harmless is through the *bacteria of decay.* The bacteria of decay are much like the bad germs which cause typhoid fever and other diseases. But instead of hurting us they do us good by breaking down and crumbling all kinds of dead matter so that it can be washed into the soil, where another group of germs, known as the *soil bacteria*, are waiting to attack it.

The soil bacteria are an exceedingly powerful and useful group of germs. In fact, unless a soil has plenty of these bacteria, it will not grow good crops. Many of our processes of cultivation, such as draining, plowing, and stirring the soil, produce their good effect upon crops largely by mixing air with the soil and keeping it porous, so that these soil bacteria can grow freely in it.

Dangers of sewering into streams. When houses began to be grouped together in villages and towns, there was soon not enough ground about each one to dispose of either liquid or solid wastes by this process of seepage and soil decay. We began to dig ditches in which the waste water from the houses was carried to the nearest creek or river. In water there are a fair number of bacteria much like those of the soil. Many plants grow in shallow places, and swarms of tiny microscopic plants float in the water. All these eat up waste. So long as we did not pour too much of this sewage into streams, they purified themselves fairly well by means of these

bacteria, and no one's health was injured. It used to be said that a stream of moderate size would purify itself of any reasonable amount of sewage in from three to five miles.

Conditions changed as the country grew more thickly settled. In fact, many of our medium-sized rivers flowing through populous districts became so full of sewage that not only were their waters quite unfit for drinking purposes, but their shores became encrusted with a slimy coating of filth and the waters grew so dirty that fish could no longer live in them.

Dangers of sewage in bays and harbors. Even where towns or villages were situated upon the seacoast, or close to the mouth of a large river where the water was salt and the tides rose and fell, the people found it was unsafe to pour their sewage directly into the bay or harbor, although the community was protected from one of the greatest dangers of sewage pollution, because the water was salt and could not be used for household or manufacturing purposes. Moreover, the salt in the sea water helped to keep it clean. Yet a modern city pours out such enormous quantities of sewage that even all the tides of a large bay or harbor cannot dilute it sufficiently, or sweep it out to sea quickly enough to prevent its making disagreeable and unhealthful deposits along the shores and wharves.

Methods of "sweetening" sewage. Instead of laying sewer-pipes to empty directly into rivers and lakes and bays, it is necessary to carry great out-

flow pipes five, ten, or fifteen miles down the coast to empty into the open sea. Sewage is sometimes caught in large basins or tanks, and purified before it is allowed to flow into the streams. Sometimes strong chemicals of various sorts are added, which remove the odors or cause the dirt and silt dissolved in the sewage to sink to the bottom of the tank, leaving the water above it comparatively clean. This is drained off, and the mud or sludge at the bottom of the tank is shoveled into carts and used for fertilizer.

Another method is to make a series of coarse filter basins through which the sewage is passed. To a limited extent sewage provides its own remedy. Being full of decaying material, it is swarming with the germs of decay, and — in the case of ordinary house sewage particularly — all that is necessary is to delay it from twenty-four to forty-eight hours in basins or tanks, called *septic tanks*, and allow these germs time to multiply enough to destroy the greater part of the filth which the sewage contains. It is surprising how much these tanks improve the condition of even the worst ordinary sewage. Unfortunately, however, they will not deal satisfactorily with manufacturing waste or sewage containing strong chemicals.

For a single house or group of houses, or for a sewer draining a residence district or suburb, the establishment of such a tank will take care of the sewage at a very moderate expense. A septic tank

to deal with the sewage from an ordinary house can be constructed for about ten dollars. When properly managed, the liquid which flows away from it will be almost free from odor and clean enough for fish to live in, although, of course, it will still have a good many germs in it. Such a tank is much superior to the old-fashioned cesspool, which was simply a pit dug in the ground, roofed over, and covered with soil, into which the house drains emptied. If the soil was sufficiently porous and the cesspools far enough away from any house, it would often dispose of the water fairly well; but in clay soils, and at rainy seasons of the year when the soil became water-soaked, it would overflow and become offensive and unhealthful.

Sewer-pipes and traps. In towns and cities it is important that the sewage from the houses should be carried in pipes separate from the drains that carry away the storm water from the streets. In the old days sewers were made to carry off all the water which was to be drained away. Consequently the pipes had to be of enormous size. The famous sewers of Paris are large enough to allow a boat to float down them, and to permit men to walk through them upright. Once they were actually used as hiding-places for thieves and for stolen goods. In sudden heavy rainfalls, however, the largest sewers may become choked with storm water, and the sewage from the houses which trickles down at very much lower pressure may be forced

back up the pipes and may flood the cellars or rooms.

The flow of ordinary house sewage is steady, and requires a pipe of only about one tenth of the size needed to carry away flood water. It is dangerous to have a sewer-pipe too large, because, unless the pipe is small enough to keep a current flowing steadily through it, filling it at least half or two thirds full, the filth dissolved in the sewage will dry and deposit along the edges. Before long the pipes are choked with this deposit, which soon begins to decay and gives off the once much-dreaded sewer gas. Being lighter than air, this gas, instead of flowing down with the sewage, rises uphill through the pipes, and finally works its way back into the houses themselves. To prevent this backing-up of gas, it is customary to put in each drain-pipe a U-shaped or S-shaped bend, known as a *trap*, which always remains full of water and prevents the gas from flowing back. Although these traps are still used to prevent any accidental gas formation and return, they are scarcely necessary in these days when sewers are made of small size, with tight joints and smoothly glazed inner surfaces. Besides, while sewer gas is disagreeable, it is not seriously dangerous to health.

Garbage-cans and carts. Liquid waste or wastes that can be dissolved readily in water are best disposed of through sewer-pipes. In the country, the solid waste from the kitchen is fed to pigs and

chickens. In towns and cities this method of garbage disposal is out of the question, and each house is required to provide itself with two garbage-cans, one for food scraps and the other for ashes, tins, bottles, and other dry waste. These cans are collected, under the management of the health department or the street-cleaning department, by carts which carry the garbage away to be burned or buried.

Garbage-carts are usually made of iron to prevent leakage of any liquid garbage as they are being driven through the streets, and they should have tight covers to prevent the lighter portions of the garbage or dust from the ashes from being scattered about the streets.

Burying, burning, and reducing garbage. One of the most annoying city problems is that of the final disposal of garbage. In an earlier day, people used to dump the garbage in some field or lot at a distance from the edge of the town. This quickly bred abominable smells and swarms of flies which the wind often carried back to the town. If the town grew, the garbage-dump became a nuisance to the outlying houses.

Cities built by the sea or near large lakes piled the garbage into scows, towed it several miles out, and dumped it overboard. After this process had gone on a few years, it was found that the garbage had a way of coming back. The shores of the lake or river or the bathing-beaches far down the harbor would be fringed with unpleasant scraps and refuse.

A somewhat better method was to establish a *reduction plant* in the suburbs at some distance from the city. Here the water was squeezed or cooked out of the garbage, the grease or fats were extracted, and the remainder burned or turned into commercial fertilizer for use on farms. This was more cleanly than the dumping processes, and had the advantage of saving money for the city, because the grease and fertilizer from the garbage were valuable enough to make the contractors willing to collect the garbage, or even to pay the city to deliver it to them. Unfortunately, the reduction plants produced offensive odors, and caused a great deal of complaint for miles in various directions, according to the direction of the wind. The substances recovered from the garbage were often used for questionable purposes. The grease was employed in the manufacture of soap, and it was even whispered that, by some special deodorizing process, it was turned into imitation butter. On the whole, this method proved more or less unsatisfactory.

There are only two forms of disposal which are cleanly, efficient, and wholesome. One is to burn the garbage in specially constructed furnaces known as *incinerators*. The ashes and garbage are mixed together, for it has been found that there is enough unburnt coal in ashes to burn the garbage when a forced draft is supplied. The fumes which rise from the burning are driven by fans through pipes which carry them back again and again through the

furnace until they are entirely consumed. The chimney of a good garbage incinerator makes no visible smoke, and everything brought to it is turned into clean, odorless ashes within ten or twelve hours. These garbage incinerators are as inoffensive as any ordinary manufacturing plant, and can be established at any point convenient for the collection and delivery of the garbage. Such plants cost considerable money to install, but the large amount of heat generated may be used to furnish power for manufacturing purposes or for lighting the city or for running its street-car system.

The other satisfactory system is much less expensive, but is somewhat liable to be interfered with by stormy weather or severe cold. It is based on the old method of burial. A region of ground from ten to forty acres in extent, according to the size of the city, is set apart, and trenches four or five feet deep are scraped across it at regular intervals. Each day the garbage is deposited about two feet deep in the trenches, sprinkled with coal oil or some chemical to prevent fly-breeding, and covered with earth to a depth of eighteen inches or two feet. By the time the entire surface of the area has been trenched and covered in this manner, the garbage in the trench first filled has so completely decayed that a new trench can be dug and the process started across the tract again. One acre of land for each ten thousand people is enough.

CHAPTER XXV

STREET-CLEANING AND PAVING

Where dust grows. Dust is not only unpleasant to look at, but it is a very serious danger to health. Indeed, next to sewage and garbage, it is probably one of the most unwholesome things with which we have to deal, particularly in cities and towns. Dust in the country, which blows from the surface of ordinary dirt roads, or from cultivated fields, may not be dangerous to health. City dust is quite a different matter. In winter a considerable part of it is composed of soot and fine ashes from coal smoke. This, though disagreeable, is not especially dangerous to health.

But street dust which blows from the pavements swarms with bacteria of all sorts, and is most unwholesome. About half of it is dried horse-manure. Add to this the germs of catarrh, bronchitis, and tuberculosis which have been expectorated upon the pavements, and you have as unwholesome a mixture as could well be imagined.

The other town and city dusts which come from various manufacturing processes are almost equally unwholesome. The fumes from chemical works or blast furnaces are irritating and poisonous. The lint from cotton or woolen mills, or the dust from

flour mills, furnishes an excellent breeding-ground for germs.

How dust gets into our systems. The chief danger of dust is that it is so light and fine that it can be blown about by the wind. The commonest way for dust to get into our systems is through our noses and throats. Many of our most serious diseases enter in this way. Curiously enough, germs seem to be more dangerous to health when mixed with dust. Probably the irritation of the dust in our noses and throats inflames the mucous membrane and cracks it so that germs may gain an entrance into our blood. Certain it is that several very dusty trades are likely to cause tuberculosis in those employed at them. In some of these trades the dust itself is comparatively free from germs. For instance, the dust from the emery wheels used in sharpening knives and tools causes in the workmen a form of consumption which used to be known as "knife-grinder's asthma." The dust raised by chipping stone or marble with a chisel is likely to give rise to consumption in masons and stone-cutters. One of the most dangerous dusts of all is the fine black carbon dust from dried printers' ink, which floats about in printing-shops and pressrooms. Dust is also blown upon our food, or scattered over our clothing and hands, and then carried into our mouth in the process of eating.

How dust is kept down. It will be seen that the problem of keeping down dust is of great impor-

Courtesy Countryside Magazine.

BUILDING A GOOD ROAD

tance to the community. One of the simplest methods of keeping down dust is by various forms of sprinkling. In town and village streets the passage of the street sprinkler at regular intervals is almost a necessity in the summer.

Sprinkling with some form of crude oil (petroleum) has the double advantage of keeping down dust not merely for a few hours, but for several weeks or months. At the same time it forms a firm, smooth coating or pavement. It can be used with excellent effect upon city, village, or residence suburb streets. The oil helps to prevent flies and other insects and kills their eggs wherever it comes in contact with them. In the downtown parts of cities this oil coating is not so suitable. If applied over dirt or macadam roads, the heavy traffic is likely to break it up before it can form its dust proof surface. Here the problem is met by the use of various forms of paving which have a smooth, even, and waterproof surface which can be readily flushed down with the hose. Different substances are used for this purpose, ranging from the rather expensive asphalt to mixtures of cement and creosoted wood blocks.

The main thing is to get a smooth waterproof surface which can be swept and scrubbed like a bathroom floor. Then, if the street cleaners are kept busy with broom and shovel all day collecting the coarser dirt as fast as it is deposited, at night the hose can be turned on the streets and the finer dust

and dirt washed down into the gutters and carried away through the storm sewers.

Pavements and health. The problem of paving a city or village used to be regarded solely as a means of making traffic easy and preventing miring of wagons in muddy seasons. Now it is coming to be looked upon as an important step in the protection of health. The older paving materials, such as cobblestones, granite blocks, and wood blocks, kept the wheels of the carts and carriages out of the mud and rendered it possible to cross the streets in all weathers without rubber boots, but they were not very satisfactory in other ways. Most of them had such a rough and uneven surface that they were difficult to clean with either broom or shovel, and nearly all of them had cracks into which dirt and germs were washed if one attempted to flush them with a hose. Wooden pavements decayed and became a breeding-place for germs. Asphalt, tar, oil, cement, and other smooth-surface pavements are much superior for driving purposes to the old-fashioned block and cobble pavements, and they keep clean, free from filth, and from disease-spreading dust. They cost more to lay, but with proper care they last so much longer that they are a good investment.

Clean, noiseless, dustless streets. Moreover, such pavements reduce the noise of passing carriages and wagons more than fifty per cent. They shed the water quickly and completely into the gut-

ters and sewers, and consequently dry very quickly after rain. They give almost constantly a dry surface for children to play and adults to walk upon, and hence there is much less moisture in the air of cities than in corresponding areas in the country during the rainy season. Taken in connection with the surface covered by houses and by water-tight sidewalks, and the drainage afforded by sewers, one sees that from one half to two thirds of the surface of our cities is practically roofed over, and the soil beneath it kept dry, porous, and wholesome the whole year round.

Streets as playgrounds. We are coming to look at our city streets from another point of view — that of playgrounds for children. If it were not for the danger from traffic, the cement sidewalks and clean asphalt pavements would provide wholesome and admirable places for children to play.

As in many crowded districts the streets are the only playground available, they are now being made safe for this purpose by restricting traffic along certain streets in residence neighborhoods. These streets are closed to wheeled traffic during certain fixed hours of the day.

Streets as gardens. While streets were originally laid out merely to allow foot passengers and wagons to get about to the different houses along them, it has been found that there is a great deal more space than is actually needed for traffic. Streets, therefore, are being used to let in air and

A CITY PLAY-STREET

Part of a street in a crowded city district closed to traffic so that the children can have a place to play.

light and to provide places for recreation and exercise. Some kinds of traffic, such as street-cars, drays, heavy wagons, etc., are kept on certain streets, and other streets are turned into road parks or recreation-gardens by taking strips down the center or along the side and planting trees, grass, and flowers. As street railways and automobiles gradually take the place of horse-drawn wagons and carts, it seems probable that some day more and more of the city traffic will be run through open or closed subways. By using the space saved in this way from wheeled traffic, all but our busiest trunk-line streets may be turned into a series of attractive public parkways.

CHAPTER XXVI

PARKS, PLAYGROUNDS, AND SWIMMING-POOLS

The green lungs of the city. Cities are like animals, not only because they grow and have to be fed, but because they need plenty of air to breathe. In the beginning they are so small and so loosely constructed that they have about them all the air they need. The country end of every street is an open mouth to draw in pure air, just as a living sponge or a sea anemone absorbs air from the sea water through the pores all over its surface.

When cities grow to be miles square, however, with thousands of acres of solid blocks of houses cut up by narrow streets, with sky-scrapers making the main streets look like mountain canyons, and with a forest of tall chimneys belching clouds of thick smoke, the pure country air loses its purity before it is halfway to the business center. Therefore, the city must provide breathing-places, or lungs, in its interior, into which the fresh air can blow, and where children can play on the grass in the pure air and sunshine. Parks, open squares, playgrounds, and boulevards are literally the lungs and the air-passages of a city. They are absolutely necessary to its health.

Where the grass grows, we grow. Until recently,

parks, public gardens, and boulevards were looked upon chiefly as ornaments to the city. Strangers were taken to see them. People strolled there on Sundays or holidays and listened to the band concerts. The place of honor in them was given over to beautifully laid-out and costly winding drives and roads. Carefully tended flower-beds came next in honor, and the grass was kept like a velvet carpet, never to be played upon or rolled over. Consequently, most of our older parks needed to be re-arranged in order to make them playgrounds and health resorts for the mass of the people.

The modern view of parks is widely different. Though we value them highly as beauty spots and civic ornaments, their principal service is to contribute to the health and comfort of the community. Instead of being content with one great landscape garden miles away from the crowded parts of the city, we are trying to scatter parks over the entire area of the city, so that at least each ten thousand people shall have a breathing-place, if it be only a block in area, and no family shall be more than a mile, or fifteen minutes' street-car ride, from a fair-sized park.

This involves the spending of a great deal of money, especially since land in the downtown districts has become so high-priced; but in the end it will be worth all its cost. Children cannot grow strong except where the grass grows; and no city can call itself great or hope to continue prosperous

which does not make itself a wholesome, happy place where children may play and grow to strong, healthy manhood and womanhood. This is the aim of one of the most wonderful world movements of our time, that of city planning and city beautifying, upon which millions of dollars are being spent every year in every country of the civilized world.

Play-places for children. Instead of putting "Keep Off the Grass" signs everywhere, the first thing a modern park provides is abundant play-places for children. Some of these are stretches of soft green turf, carefully graded and drained so as to dry out quickly after a rain, where children may roll and tumble and play to their hearts' content whenever the weather permits. Others are broad stretches of sand and gravel, also carefully drained, so that they never become muddy or puddled. Large sand-boxes are placed at each corner, and swings, merry-go-rounds, seesaws, and stretches where the simpler games can be played, are furnished. As these can hardly be made ornamental in appearance, they are usually screened with rows of bushes and fringes of trees, under which seats are arranged for nursemaids and tired children.

Swimming and wading pools. In addition to the purely ornamental ponds, special wading pools are constructed. These are shallow basins dug in the ground. They measure from fifty to one hundred and fifty yards across, and are not more than two or three feet deep in the center. They have cement

bottoms and sandy shores, are filled from the hydrants, and are provided with escape pipes like those of bathtubs. They can easily be emptied and thoroughly cleaned at regular intervals. In warm weather children can wade in these pools and splash and sail boats and fish for imaginary minnows. In winter they can skate on them with perfect safety. One or two of the larger pools have bottoms carefully graded and artificial beaches laid down so that they can be used as swimming-places in hot weather. Dressing-rooms and shower baths are provided on the shore.

Playgrounds for boys and girls. Other parts of the park, screened with trees and shrubbery, are devoted to sanded and graveled spaces where baseball, football, and all kinds of running games can be played. Other portions are devoted to lawn-tennis courts, and in the largest parks golf links are laid out. In the outlying parks handsome athletic grounds are arranged, with running-track, football gridiron, baseball diamond, and a public stadium where games and sports can be held and open-air concerts or pageants given.

Open-air lunch-rooms, cafés, and model dairies. All modern parks now make a special point of providing plenty of places to eat in the open air. Instead of selling restaurant and lunch-room privileges to private individuals, the city now supplies the food — in some cases at cost — or else rigidly inspects and certifies everything served on the stands.

Not only are restaurants provided near music-stands or boat-houses, but little *kiosks* where simple lunches, pure candy, fruit, ice-cream, and pure soft drinks may be purchased are scattered all over the grounds. Also there are pavilions with benches and tables where those who bring their own lunches may eat them in comfort. In many of the European parks small model dairies are established, with half a dozen high-grade cows in a model and carefully kept stable and milking-shed. The children not only can buy pure milk and cream to drink with their bread and butter and cakes, but get an object lesson as to how dairies should be conducted to keep the milk pure and wholesome.

People's country clubs. In some of our most progressive park systems, like that of Chicago, for example, country clubs are built in the different parks. These are provided with hot and cold baths, a swimming-pool, a gymnasium, a library, a dining-hall, a concert-room, a restaurant, and all the equipment of an ordinary private country club. They are open to any one in the community. In one of them, situated not far from the Chicago stockyards district, fifteen hundred hot baths are often taken in a single Saturday afternoon and evening; while the visitors to the library, the restaurant, the reading-room, and the gymnasium are numbered by tens of thousands.

Picture galleries, museums, and zoos. Institutions of this sort have always been considered orna-

Courtesy Russell Sage Foundation

Courtesy Town Room, Boston

WINTER AND SUMMER AT A CIVIC PLAYGROUND

Skating in winter and swimming in summer are most healthful exercises.

ments of city parks and their value is even more widely recognized to-day. Every region of a great city should have within easy reach such an institution which is a means of pleasure, education, and culture for the neighborhood. Some cities have large halls for the permanent display of objects of local historical interest, or of the products of the region or State. Expositions, exhibitions, and various kinds of educational displays can be held in them from time to time.

Band concerts and dance pavilions. Last, but by no means least, the modern park has plenty of bandstands surrounded with circles of benches, where concerts can be given in pleasant weather. Many of them have halls in which concerts are given in the winter or in stormy weather.

The most attractive features of a city park are its level greens, open-air dancing-floors, and roofed pavilions, for public dancing. Folk-dances and morris dances are among our most valuable gymnastic exercises. These dancing-greens and pavilions form one of the most popular features of our parks. The order maintained and the character and refinement of the dances and entertainments conducted have been most satisfactory. Many cities are following the lead of Chicago, and establishing municipal dance-halls in the downtown and residence districts for dances and entertainments of all sorts in the winter months.

CHAPTER XXVII

HOUSES AND STREETS

Our right to a healthful and beautiful home. Houses are places in which to enjoy life. Almost any house with plenty of room, a water-tight roof and a dry cellar, a good chimney and plenty of windows, can be made into a comfortable and pleasant home.

As long as houses were dotted about on farms or built on village or town streets with large lots and grounds, there was little trouble in making them healthful and attractive. A pretty garden is worth three best parlors; and a green lawn or a creeper-covered piazza adds to the healthfulness and pleasure of life. A pretty cottage with green grass and flowers and sunshine on every side, with simple furniture, fresh paint, and clean white curtains, is a home fit for a king.

But when houses are wedged in solid ranks on each side of a city street, with a narrow front yard, a narrow back yard, and no side yards at all, it is very difficult to make even a ten- or fifteen-room house with bathroom and furnace a really healthful, comfortable, livable home. To such an extreme has this crowding gone that the central rooms in many city houses are almost completely cut off from light and air. This has become such a serious cause of ill-

health that most cities have passed special building and housing laws, requiring houses to be built a certain fixed distance apart, not to cover more than a certain share of the lot, and insisting that courts, open spaces, or air-shafts shall be provided so that every room in the building shall have at least one window and enough light to allow ordinary print to be read in the room during the hours of daylight.

How houses become disease-breeders. These laws lay down certain rules for building all new houses, and also provide that, wherever older houses have been built with windowless rooms, changes must be made to let in light. At first sight, perhaps, this seems rather meddlesome; but when a careful study of the situation in New York, for instance, showed that there were over three hundred thousand dark rooms in New York City alone, it was clear that something must be done. Studies made by the city health authorities and housing commissions quickly showed that the deaths, particularly from tuberculosis, of people who slept in these dark rooms were from three to five times as great as those of the rest of the community, and that the smaller the number of rooms and the darker the rooms into which the families were crowded, the higher was the death-rate and the greater the amount of disease. Even the children who grew up in two or three rooms with poor light and air were several inches shorter at seventeen than those who lived in larger apartments in better parts of the town.

This most unhealthful condition arose almost by accident. In every city it is invariably the old houses which are the worst. Many of them were originally built in open spaces, and as long as they stood in private grounds with plenty of air and light about them, they were wholesome, comfortable homes. Then the neighborhood gradually became unfashionable. Land went up in value. New houses were crowded in between the old structures, porches that had looked out over gardens were closed in and turned into rooms, large houses were cut up into suites to accommodate six or eight families, and in

Courtesy Town Room, Boston

THE ONLY PLACE THEY HAVE TO PLAY

Do you think these boys would play on a slippery, icy street if the city had parks, or neighborhood playgrounds, or community centers? Do you think it would be better for these boys if they had a playground? Why? What do you think of their city.

a little while the neighborhood became a human rabbit warren.

This overcrowding and self-suffocation and self-infection has come to be regarded as one of the most serious dangers to the health of our citizens. Processes like this have built up the famous "Lung Block" in New York City, for instance, where the number of cases of consumption and deaths from tuberculosis was three times as great among its nine hundred tenants as in the rest of the ward, and five times as great as that of the general average of the city.

Planning the city for health and beauty. Fortunately, the disease of overcrowding carries with it its own remedy, if we have the sense and courage to apply it. The same high price of land and high rents which cause the overcrowding make it profitable to tear down these wretched old shacks and build healthful model tenements in their place, from the rents of which the owner can realize a reasonable percentage on his investment. When the old rookeries are near the wholesale or manufacturing quarter of the city, it is possible to tear them down and erect office buildings, factories, or shops in their place, providing model tenements or cottages in the suburbs and cheap transportation for the former tenants. Where the property owners are not progressive and public-spirited enough to do this, most European cities purchase the land and erect model dwellings or make such changes as are necessary to

protect the health of the workers. In most cases, the only reason why private owners refuse to put in suitable houses and tenements is that they are making an enormous percentage of profit on their original investment. Since from these disease-breeding old houses the owners can secure fifteen, twenty-five, or even thirty-five per cent per annum interest, they are not anxious to exchange this income for a reasonable six or seven per cent, no matter how much their profit costs in human life and human suffering.

In all modern European cities, and in many of the most progressive American communities, the city is avoiding this danger by laying out and planning in advance its streets and parks, houses, lots, and manufacturing districts. A well-managed municipal plan promotes the health and comfort of the entire community, as well as adding greatly to the beauty of the town and the pleasure of living in it.

The best time to plan a city is when it is first founded; but since nearly all American cities began as small villages and did not know in advance how big they were going to be, we have to do the best that we can by remodeling the older parts and seeing that all the new parts and suburbs of the city are built up on beautiful and healthful lines.

The zone plan. The best method of doing this is carefully to map out and study the situation in the different regions of the city, establish a community center, and then divide the city into a series of broad rings or belts around it, known as *zones*.

The central or business part of the city will usually be divided into three districts: the retail, or shopping, district; the wholesale, or warehouse, district; and the manufacturing, or railroad, district. The next belt surrounding this central district will be Residence Zone One; the next, Zone Two; and so on out to the open country, according to the size of the city. Rules are laid down for each of these zones, chiefly with reference to the height of the buildings in proportion to the width of the street upon which they face, their nearness to one another, and the percentage of the total area of the lot which they are permitted to occupy. These rules prevent crowding.

Remodeling the city. Then the city proceeds to widen narrow streets, straighten crooked ones, cut through such new ones as are needed in the downtown districts, and lay out broad boulevards connecting the center of the city with the different suburbs and with the parks, public buildings, museums, art galleries, etc. The most radical change is usually in the manufacturing zone. This zone is always placed in such a direction from the center of the city, that the prevailing winds blow from the city toward the factories, in order to carry all smoke, fumes, and dust away from the crowded center and from the residence district. The railroads are given space for their freight yards in this section. This method makes it sure that no matter how large a city may grow, no part of it can become overcrowded and it will still

remain well lighted, well ventilated, with broad beautiful streets and parks in every section. Many of the European cities own their street-railway systems and are rapidly buying up all the vacant land within and around their limits for two and three miles in every direction.

Street-parking and gardens. The great objection to city remodeling and planning is that it seems expensive; but this expense is only apparent. The saving of the waste from sickness, suffering, and deaths is so great and the increase in the earning power and efficiency of the community is so marked within ten years that it pays back into the city treasury four or five times as much as it costs. If this skillful and intelligent planning is done in advance for new cities, and for new parts of old cities, there is no additional expense, but rather a saving all along the line. Private real-estate and building companies now are finding that it pays them well to devote from ten to twenty per cent of the land in their new suburbs or additions to parks, gardens, and playgrounds. People are beginning to demand these things as necessities of life, health, and comfort; and a suburb or building addition provided with them attracts more purchasers and a better class of tenants. The more that cities or people spend in improving their health and increasing their comfort and promoting the comfort of life, the better it is for all the people living in them.

CHAPTER XXVIII

OUR INSECT ENEMIES

Why we fight insects. Within the last thirty years we have discovered that some of the smallest things are the most dangerous. The deadly disease germs which cause sickness and often death are so tiny that they must be placed under the strongest microscopes to be seen at all. Within the last fifteen years we have discovered that the greatest carriers and spreaders of these disease germs, and the most serious wasters of our crops, are insects.

We have always disliked insects. They crawl, they buzz, they get into things, and they bite. But we have regarded them as nothing more than an annoyance, and have even made a joke of them. For instance, nobody took a mosquito-bite seriously.

Now we have found, much to our surprise, that insects are more dangerous to the human race than all the lions and tigers put together. The worst enemies of mankind are not the huge beasts of the forest, and not other men, but tiny, feeble, buzzing, crawling insects. The real battle for the possession of the earth is between us and insects.

This may seem hard to believe. Yet it is a fact that the mosquito *Anopheles*, which carries malaria, and the other mosquito *Stegomyia*, which carries

yellow fever, cause at least half a million human deaths every year in the entire world, and an enormous amount of sickness and suffering besides. The tiny jumping rat-flea which carries the bubonic plague germ, has a recent record of nearly ten million deaths in India and China alone during twenty years. The hookworm is estimated to infest the intestines and suck the blood of over two hundred million people in the tropics and subtropics. Indeed, it is more than probable that in the tropics insects have kept man half-civilized, stupid, and feeble, and that this is the principal reason why no lasting high-grade civilization has ever yet grown up there.

The best general rule to lay down is to kill swiftly and painlessly every insect that comes within reach. It sounds bloodthirsty and cruel, perhaps; but unless we kill the fly and the mosquito, they will do their best to kill us.

Insects that eat our bread. In addition to the human suffering caused by insects which carry disease germs, insects also are the principal enemies with which the farmer and fruit-grower have to contend. The United States Department of Agriculture estimates that the annual loss in the farms and orchards of the United States by the ravages of insects is over $100,000,000 a year.

Protecting the birds is the first and most far-reaching step in a campaign against insect enemies. The birds are our best allies. A few of them, it is true, eat some of our fruit and grain; but this is a

small reward for the enormous help they give us in killing our insect enemies. Though many birds live largely upon grain, seeds, and fruits, most of them eat thousands of insects the year round, and all of them gather large numbers of insects during the weeks when they are feeding their nestlings, because all young birds require insect food.

Swallows live largely on gnats, to which family all mosquitoes belong. There is an old folk saying that wherever swallows build their nests the air is wholesome, and probably the real reason for this saying is that they make it wholesome by destroying the pestilent gnats, mosquitoes, flies, and other insects. In other words, our birds not only protect our health by protecting our food from insects, but by eating the insects that carry disease germs.

So make pets and companions of every bird about the garden, or orchard, or barn or woods. They will not only sing for you and delight you with their beauty and grace, but they will stand between you and hunger and between you and disease like a living, fluttering wall of eager beaks and nimble wings.

The insect and the worm. The term "insect" includes not merely beetles, grasshoppers, butterflies, flies, and bugs, but also about ninety per cent of our common worms — the army worm, the cutworm, the wireworm, the apple worm, the cabbage worm, etc. All of these come from the egg of a flying insect, and after a little time they will change into flying insects themselves — beetle, moth, butterfly, or fly,

as the case may be. The flying insect flutters about and lays its eggs. The eggs hatch into a worm-like creature — "wiggler," maggot, caterpillar, or whatever it may be termed. This stage of its growth is called the *larva* stage. By and by the larva goes into a *chrysalis*, from which it hatches out into the full-grown flying insect again. Practically all so-called "worms," except the angleworm and the tapeworm, are really the larvæ of insects.

While it is difficult to catch and destroy the flying insect, it is quite possible to attack successfully most insects when in the egg or the worm stage. In fact, three fourths of the war against insects, both crop-destroying and disease-bearing, consists in keeping them from hatching out of the egg or growing into the mature insect.

Fighting the mosquito. First and most important of the insects we must fight is the mosquito. He is almost as common as the fly, and there is no question about the certainty and deadliness of the disease he carries. After he is hatched, it is impossible to try to destroy him. The main point of attack upon him is the pool in which he breeds. Mosquitoes can hatch only in standing water. If there is no standing water, there are no mosquitoes. Drain the pools and sloughs and low places within five hundred yards of your house, and you will have few mosquitoes, except when a strong wind blows them up from distant swamps or cattle and horses carry them up from the river or pond.

Inasmuch as three fifths of the earth's surface is covered with water, this does not seem to give us any particular grip on the mosquito. But fortunately he cannot breed in running water. It is only in small pools of stagnant water that he can develop, or in the quiet water that occurs among the grass and lily-pads around the edge of a larger body of water. Why? Because the action of the waves which have a chance to be raised by the wind on a large pool drown all the mosquito larvæ that might be hatched. Also certain fish that live in shallow water devour the larvæ. Consequently every pool bigger than an ordinary barn floor, providing its edges are kept free of grass, weeds, etc., will not breed mosquitoes. The mosquitoes which you see over rivers, streams, and lakes have not been hatched in open water, but in little puddles of rain-water or little hollows left full of water as the pond dries up and shrinks during hot weather, or among the grass growing in shallow places along its edge. It is even possible that many come from some rain-barrel, or cans in which water is caught around a neighboring house, for such accumulations of stagnant water are frequent, though unsuspected, sources of mosquitoes in the neighborhood of houses.

How do we know that these things are true? Take the case of the great salt marshes and the swamps along lakes and rivers. Many of these areas have been completely freed from mosquitoes by

simply digging ditches from these scattered pools so that the water may be drained off before it has time to breed mosquitoes. Then care is taken to keep the ditches clear and free from growth, so that the flowing of the water will not be hindered, and the pools will not be formed again.

But what are we going to do with places which cannot be drained and yet are not large enough to be much affected by the wind? The answer is, Use oil. This may be in the form of kerosene, or a mixture of kerosene and crude petroleum. The mixture is usually used for large operations and the kerosene for small ones. The oil should be applied very early in the spring, for while most mosquitoes require a pool of water that lasts three or four weeks in order to hatch their eggs and bring them through the "wiggler" stage in safety, they can live in very cold water and hatch in the almost freezing pools of water left by the melting of the snow in the spring. So these little early spring pools and sloppy places should be sprinkled with kerosene if the woods and brush patches are to be free from mosquitoes in summer. The kerosene acts partly as a direct poison, and partly by making a film over the surface of the water. This cuts off the air so that the tiny "wigglers" can get none to breathe when they come up to the surface.

Municipal mosquito campaigns. Mosquito campaigns are now regarded as a part of the regular work of progressive boards of health, just as street-

cleaning and pure-milk supply and sewage disposal are managed by the city; and a great many places in the United States which were formerly infested with mosquitoes all summer are now almost entirely free from them. Even the famous Hackensack marshes of New Jersey and the salt-water swamps around Staten Island have been made fit for people to live in during the summer; and several areas along the New England coast, notably Connecticut just north of New York City, have been made almost mosquitoless summer resorts.

In other words, if the health officers and property owners will work together, they can rid any town, village, or summer colony of mosquitoes within two years. The only thing that the town has to do is to make up its mind that it will not permit the mosquito, and persist in draining and kerosening until the pest is wiped out.

What to do with the fly. "Swat the fly" has come to be a common phrase; but the real place to attack this pest is at the same point in his life career as the mosquito — at the breeding-ground where the eggs hatch and the worms or maggots develop into the full-grown insect.

There are nearly three thousand species of flies, each one numbering its hundreds of millions. Out of these three thousand, however, there is only one which causes us serious trouble — the house-fly, *Musca domestica*. As his name suggests, he is a domestic insect living in the piles of dirt and rub-

bish which gather in barnyards, back gardens, and alleys, and the campaign against him is a never-ending campaign of cleanliness. You may haul away the manure and clean up the garbage piles and make everything about garden, barn, and alley tidy, offering no place for a single fly to lay her egg; but unless you are always on the watch, the manure-pile will gather again, and the dirt-heaps reappear, and in a little while you have it all to do over again.

On the other hand, the fly is easier to get at than the mosquito, because he lives on the same lot with us; and the cleaning of each individual back yard and barn takes much less time and money than the draining and kerosening of mosquito pools. Besides, it is so pleasant to have our surroundings wholesome and orderly and clean that it would be worth while to clean up our yards even if it were not for the fly. Every fly is a sign of hidden dirt somewhere, and is a disgrace to the neighborhood where he is found.

Every fly, moreover, is a disease-carrier. His hairy legs and feet are covered with every kind of dirt and filth to be found in the neighborhood, which he carries to the kitchen and leaves on our food, our tables, our furniture, our bedding, and on our faces while we sleep. There is no excuse for his existence, and every reason for getting rid of him.

As in the case of the mosquito, it is of little use to waste time with fly-papers, fly-traps, or " swatters " after the insect is full-grown. The way to destroy him is to destroy his breeding-place.

It takes from eight days to several weeks, depending on the temperature and food, for the fly to hatch out, grow through the maggot stage, pass into the brown chrysalis, and come out as a full-grown insect. During this period he must have abundance of food. He likes best decaying vegetable matter, such as horse-manure which is soft enough to be easily eaten, and yet porous enough to let in the air which the maggot needs while he is growing.

If the manure-heap is too wet and soggy, the eggs cannot hatch in it for lack of air; and when the manure cannot be hauled away often, the hatching of flies may be checked by wetting the heap down thoroughly with the hose and sprinkling borax on it. Again, if the manure is too dry, the maggots cannot hatch for lack of moisture; so that when the manure is spread on the land it dries out so quickly as to leave no moisture for the maggots to live on.

There are three ways, therefore, to prevent fly-breeding in manure-heaps. First, and best, the manure may be thrown directly from the barn into an old wagon and carried out to the fields every day. Second, in a city barn or stable where only a few animals are kept, it may be hauled away regularly every week. This is often enough, as the young fly cannot then complete its development, if the manure is properly disposed of. Third, if the manure cannot be hauled away as often as this, or if it is necessary for it to be piled in compost-heaps to become thoroughly decayed before spreading on the land, and if there

BABY'S SUMMER NAP

Screens on the windows, fresh air to breathe, netting to keep off any germ-carrying fly, a cover over the glass of water to keep it clean.

compost-heaps must be within five hundred yards of the house, they may be kept fairly free from flies by being sprinkled with kerosene or sulphate of iron (copperas), or by wetting down with a strong solution of borax. If the manure is to be used for fertilizer, the last is the best, because copperas and kerosene may injure the growing crops.

The United States Department of Agriculture has prepared a special bulletin giving full instructions and careful directions as to the best method of preventing flies in back yards and barnyards. If you will send a two-cent stamp to the Bureau of Entomology, Department of Agriculture, Washington, D.C., a copy of this bulletin will be mailed to you.

The rat and mouse. Although the rat and mouse are not insects, they are included under the head of vermin, and they should be mentioned here on account of the serious part which they play in the spread of disease.

Though there are many species of wild rats and mice, the only ones which give us trouble are two domestic species of rats and one of mice. These live in and under our barns, our storehouses, and our dwellings, and it is only in recent years that we have grasped the full extent of the damage and danger due to them. It is almost impossible to believe the figures of the Department of Agriculture, which estimates the damage done by rats and mice to food and food products in the United States at over fifty million dollars annually, but they are true. It is not too

much to say that one tenth of that sum spent each year for five years would exterminate them completely and stop all this waste.

Not only do rats and mice destroy enormous quantities of valuable food by eating and gnawing it, but they destroy even more by spreading the germs of putrefaction and decay. They live and range in the dirtiest possible places. From these places they bring the germs of decay to our bins, our grain-sacks, and our apple-boxes. If you can keep rats and mice out of your cellar, you will not only save your fruits and vegetables from being gnawed, but you will find that they last nearly twice as long and lose less than half as much by decaying, shriveling, and rotting.

Moreover, rats and mice not only carry these germs of putrefaction and decay to our food, but they also carry the germs of many diseases. We now know that the rat is the chief means of the spread of that terrible Oriental and subtropical disease, the bubonic plague, which sweeps away its millions every year in India and China. While we have succeeded in avoiding any widespread epidemic of this terrible disease in Europe and North America for several hundred years, it is by no means certain that we can always continue to do so; and if it once secured a foothold among us, our swarms of rats would scatter it broadcast everywhere. On the other hand, if we destroy or reduce the number of our rats, we shall not only save tenfold the cost of the campaign

by protecting our food, crops, and fabrics from destruction, and by saving our walls and foundations from damage, but we shall also be absolutely safe against any wide spread of the disease, for without rats to carry it the bubonic plague spreads extremely slowly or not at all.

The measures to be adopted against rats and mice have already been discussed in the chapter upon the cellar. If all cellars, warehouses, corn-cribs and barns were constructed so as to keep rats and mice out, it would promptly solve the problem. Without food and shelter, the animals will starve to death. However, where this cannot be done, the number can be greatly reduced by the intelligent use of traps and of various forms of poison. Poisons, however, should be used with great care, for they are also dangerous to chickens, dogs, cats, and children.

Cats are supposed to help keep down rats and mice; but for this purpose they have been found to be of little actual value. Ferrets and terriers have been used by boards of health and farmers' associations with much greater effect. Only about one cat in ten is of any real use as a mouser, and few cats will attack a well-grown rat at all. Moreover, the damage they do among young birds far outweighs their value as mousers, and the germs of disease which they carry in their fur is another serious argument against them. It is an open question whether they should not be included as pests with flies, mosquitoes, and rats.

CHAPTER XXIX

THE SPREAD OF DISEASE

How we crowd one another to death. As we have already seen, few diseases grow in the open country or spread in the open air; and so far as we can trace the origin of our great diseases, consumption, cholera, smallpox, and the Black Death, they seem never to have started in thinly populated countries, but always in some city or town where people were crowded together in narrow streets, breathing one another's breaths, and drinking water loaded with one another's waste products. It is not necessary that these towns should be very large, but only badly crowded and unsewered. In fact, a few hundred people cramped together inside the high walls of a mediæval city no bigger than a modern fort would furnish as perfect a breeding-ground for disease as a modern city of a hundred thousand inhabitants. It is true that savages and half-civilized peoples suffer from epidemics of these diseases, but they can nearly always be traced to travelers or visitors from cities and towns. Even to this day the world epidemics of cholera, the bubonic plague, and influenza start from the slums of the great Oriental cities.

How diseases are passed along. A striking illustration of how cities breed and spread diseases is

furnished by the recent history of yellow fever. For more than two hundred years our Southern States have been subject to yellow-fever epidemics at intervals of from three to five years, — ninety-five epidemics in all,— and a most moderate estimate places our loss from them in that time at one hundred thousand lives. In 1898, by the chance of war, we happened to occupy Havana and to discover the cause, or rather the method of spread, of yellow fever through the bite of the *Stegomyia* mosquito.

Acting promptly upon this knowledge, General Leonard Wood and General Gorgas completely stamped out yellow fever in Havana and ultimately in the whole of Cuba. The almost immediate result was that infection stopped coming to New Orleans. Partly by English and French colonial sanitary officers, and partly by our own army medical officers, acting under the invitation of the South and Central American Republics, the process was extended to all the larger seaports of the West Indies and the Caribbean Sea. In the years since that time there has been only one very small epidemic of yellow fever in the United States (1905), with the loss of about four hundred lives, compared with twenty thousand in 1878. After 1898 there was scarcely a death from yellow fever in Havana for ten years, and if the cities continue to keep clean, yellow fever will become a thing of the past in the United States. Clean up the city, and the country will take care of itself so far as these great epidemics are concerned.

There is no proof that even consumption or pneumonia ever started in a savage tribe or among country-dwelling people, although they spread among such people rapidly when once introduced.

Light, air, and elbow-room stop disease. Disease lives in dirt, grows in darkness, and spreads in foul air. If we keep our streets and yards thoroughly clean, our cities well sewered, and our houses full of light, sunshine, and fresh air, we have taken a long step toward making the spread of disease difficult. Diseases which used to spread like wildfire in that "thousand years without a bath," the Middle Ages, could never become a serious epidemic in a modern civilized country under up-to-date sanitary conditions. That does not mean that we may risk bringing cholera cases into this country, or allow our rats to be infected with the bubonic plague.

On the other hand, one or two diseases, like smallpox and typhoid fever, appear to be almost as common as ever under modern conditions, unless prevented by special vaccination or sanitary measures; and a few, like pneumonia, remain difficult to control.

Quarantines. Not only do diseases appear to start in cities, but the crowding of large numbers of people gives disease a good chance to spread, if brought in from the outside. We try to protect ourselves against infections, not only by making everything so clean and wholesome that it will be difficult for them to spread, but also by preventing people

with these diseases from coming into the United States.

This is done by establishing what are known as *quarantine stations* at the principal seaports of a country or the places where a great railway line crosses a state or national boundary. The doctors at these quarantine stations require what is known as a *bill of health* from the captain of each vessel coming into the seaport, showing that all his passengers and crew were examined before they came on board and found free from disease; that he has not touched at any port where a disease was epidemic; and that all those on board the vessel are now in good health. The doctors of the quarantine station then examine all the passengers and crew, and if any of them are sick with what is suspected to be an infectious disease, or if any have come from a port or country where some serious disease, such as cholera or the plague, was then raging, such passengers are taken to a special hospital, usually on some island in the bay or harbor, and kept there until it can be seen whether they are going to be sick.

If cases of serious infectious disease are found on board the vessel, the whole ship may be sent to quarantine and ordered to anchor in the bay near the quarantine station. No passengers are allowed to land until permission is given by the health authorities. The meaning of the word "quarantine" is a curious one; it comes from *quaranta*, the Italian word for *forty*, because in earlier times the passengers

SAVING THE BABIES

Not only do many cities furnish medical treatment free to their tiny citizens, but they also employ trained nurses to show mothers how to feed, nurse, dress, wash, and keep their babies healthy.

used to be held for forty days to see whether disease was going to break out or spread among them.

Cases of infectious disease occurring within a city are also quarantined. A colored placard is tacked upon the side or door of the house, with the name of the disease printed on it in large letters, so that people coming near the house may be warned against the danger of entering it. Those who are suffering from the disease, the nurse, and members of the family who are helping to care for them, are not allowed to go outside of the premises. Members of the family who have work or business outside are carefully examined. If they show no signs of the disease, they are allowed to continue their business, providing they sleep and eat outside of the quarantined house. In this way the chance of the spread of a disease is greatly lessened; and if the first five or six cases are promptly quarantined, a severe epidemic may often be entirely prevented.

Vaccines. Another special method which is used to prevent the spread of diseases, particularly of those which do not seem to lessen under civilized conditions, is by the use of *vaccines*. These vaccines are *cultures*, or small colonies, of the germs of the disease which is to be prevented. They have been killed by boiling, or have been in some way modified or weakened so as to make them practically harmless in their action. Their use is based upon the fact that after a person has had an attack of any very severe infection, such as smallpox or scarlet fever or ty-

phoid, he is usually protected against another attack for at least a number of years, and often for life. This protection is called *immunity*, and any one so protected is said to be *immune* against that particular disease. Indeed, before germs were discovered or modern science was born, it was a custom in many places to expose children and young people to the infection of different diseases when these occurred in a mild form, in the hope that they would have a mild attack of the disease and afterwards be protected against it for the rest of their lives. This was known as *inoculation*. It was, however, rather a dangerous method, because there was no certainty as to whether the children exposed would have a mild or a severe attack, and while most of them would recover, a number were almost certain to die.

Inoculation was commonly used against smallpox, which up to a hundred years ago was a severe or fatal disease. One hundred and fifty years ago one third of the people of Europe were pock-marked; over one half of those who were in the blind asylums had been made blind by smallpox; and the deaths from the disease ran up into the hundreds of thousands every year. It was worth taking some risk in the form of a mild infection to protect one's self against such a severe disease. Barely over a hundred years ago, an observant English doctor named Edward Jenner noticed that the milkmaids who milked the cows in the country district in which his practice lay sometimes caught from the udders of the cows a skin eruption

on the hands and arms, and that after they had had this, they never caught smallpox. After studying and watching the disease for over twenty years, he found that the protection given by this skin eruption, called *cowpox*, was so certain against smallpox that he finally persuaded one of his patients to allow his little boy to be inoculated with a few drops of the fluid taken from this eruption. The boy developed a mild attack of cowpox. A few weeks later, he was exposed to a very severe case of smallpox, and a few months later was again inoculated with cowpox without the slightest bad effect.

From this tiny beginning, the process spread until vaccination (so called from the Latin word *vacca*, a cow) spread all over the civilized world, and within half a century it had cut down smallpox from one of the commonest and most dreaded causes of death known to civilization to one of the rarest and least serious. From deaths formerly estimated at six hundred thousand a year, the total deaths in western Europe from smallpox now seldom reach as many hundreds. In some European countries in which everybody must be vaccinated every seven years a whole year frequently passes without a single death from this disease.

That was the first of the preventive vaccines, long before we knew anything about germs. When germs were discovered, we set to work at once to make out of them a means of protection against the diseases which they caused. It was found that our body

cells resist or conquer disease by (1) eating up the disease germs, and (2) poisoning them with *antitoxins.* When a person becomes sick with scarlet fever, for instance, the body cells begin to make these antitoxins which finally destroy the disease germs. For the rest of his after life his body cells know how to make this antitoxin, and if any new scarlet-fever germs get into his body they are destroyed before they can begin to poison him.

Vaccines work on the same principle. They produce a very mild attack of the disease. The body can easily produce enough antitoxins to overcome this light attack. Then, having learned the trick of producing antitoxins for this disease, it is prepared ever after to deal with even the most vicious types of its germs and fight off a full-grown attack of the disease.

We now have a number of vaccines against various diseases, the most useful being the typhoid vaccine. This consists either of a number of dead typhoid germs killed by heat, or a smaller number which have been mixed with the serum from the blood of a patient who has recovered from typhoid fever (which contains antitoxins). Three injections of this vaccine are given with a hypodermic needle under the skin of the arm. These injections are given about ten days apart, and protect the person against typhoid fever, usually for three to six years and possibly for life. By such typhoid vaccine the cases of typhoid in the United States Army

have been reduced to an almost negligible proportion; and even the enormous armies in the field in the European war were kept nearly free from this most deadly disease of the camps. Other useful vaccines are those against blood-poisoning, erysipelas, boils, certain blood diseases, cholera, and the plague.

Antitoxins. In some diseases we have succeeded in extracting from the blood of patients or animals that have recovered from a disease the antitoxins which cure it, so that we can use these directly in the cure of the disease as well as in its prevention. Of these antitoxins the most famous and useful is the diphtheria antitoxin, which has robbed of most of its terrors one of the deadliest diseases of childhood. Before the use of antitoxin, the death-rate used to run from twenty-five to forty per cent of the children attacked. Now the average death-rate is less than ten per cent; and in cases which are recognized quickly and where the antitoxin is used early, scarcely five per cent prove fatal. We have also an antitoxin for cerebro-spinal meningitis (spotted fever), and one for tetanus (lockjaw).

Insects that help to spread disease. One of the most valuable weapons ever put into our hands for the fight against disease is the discovery of the part played by insects in spreading it. A number of our most serious diseases cannot be spread through food or water, but must be carried directly from the blood of one patient into the blood of another. As human

beings do not bite one another, even in the most uncivilized neighborhoods, the only way in which this transfer can be made is by some biting and blood-sucking insect. The vermin which infest badly kept houses do not travel far enough to play a prominent part in this respect, although they do their little best. One of them, the flea, is the principal carrier of the dreaded Black Death, or bubonic plague — not directly from one human being to another, but from a human being to a rat, and from an infected rat again to another human being. The louse spreads typhus fever, but both vermin and disease are practically unknown in civilized communities. The champion distributors of insect-borne diseases, as we have seen, are the mosquito and the fly. The mosquito is the sole means of spreading malaria and yellow fever, one species (*Anopheles*) carrying malaria, and another (*Stegomyia*) yellow fever.

The fly is a good mixer. The other disease-spreading insect, the fly, is somewhat more difficult to deal with. If we do not keep him out of the house by screens and "swatters," we can rely on his bringing us a sample of every kind of filth in the neighborhood.

We have seen in a previous chapter that nearly all the flies that come into a house are bred on the premises; and in many districts it is entirely for us to decide whether we will have flies about the house or not. In cities and thickly settled neighborhoods the community has to assist by passing laws forbidding

the accumulation of manure-heaps, garbage-heaps, piles of dirt, or collections of trash big enough to decay and keep moist in the center. Any warm moist spot of this description will be used as a nursery by the fly. Nearly all cities now have laws aimed to prevent the breeding of flies, but they are often not as well enforced as they should be.

One of the most useful services children can render to the health of the community is to form groups and associations for the sanitary inspection of the neighborhood. Admirable work has been done by the Boy Scouts and similar organizations. Sometimes they coöperate with the health authorities or the police. The neighborhood is divided into districts, and each street or block or alley is assigned to one or more boys and girls, who patrol it every day and make a report to the sanitary authorities, or to the police, of all the garbage piles, dirt heaps, offensive and decaying substances, or unwholesome manure heaps.

At first a few property owners and householders will resent this method of reminding them of their civic duties; but if the inspecting and notifying is politely and tactfully done, it is not long before the whole neighborhood appreciates the improvement in looks and health conditions brought about by this method. Every good citizen, young or old, is responsible not merely for passing laws, but for their enforcement. Merely to put a law on the statute books and then leave it to the regular officials to enforce will never produce much result. The officials

have a right to demand the assistance of the community, and it is a great help and encouragement to them to feel that they have its sympathy and support in the performance of often difficult and disagreeable duties. Some one has invented a new civic commandment: "Thou shalt bear witness against thy neighbor's garbage heap."

By such methods it is possible to make a town practically "flyless," and it has been repeatedly done. The city of Cleveland, for instance, by a campaign of education and coöperation has made the fly a curiosity throughout its more than half a million population. Civic helpfulness of this sort in which the boys and girls play a most important part has far-reaching results.

Cats, rats, and tramps. Three other kinds of disease-spreaders are the domestic cat, the rat, and the tramp. As a carrier of infections, the cat has few superiors. As has been shown, rats and their fleas are responsible for the bubonic plague, and we have no certainty that some day it may not get a foothold here, unless we destroy our rats.

Tramps also are dangerous disease-spreaders, on account of their often having some infectious disease, and of their wandering habits. It is high time that the community woke up to the need of dealing radically with the tramp problem. They should be grouped in farm and industrial colonies, given good food and shelter and happy surroundings, made as nearly self-supporting as possible, and prevented from spreading disease and crime.

CHAPTER XXX

THE GREAT CAUSES OF DEATH

Mortality statistics. For several years the Census Bureau at Washington has been collecting statistics about the causes of death over a large part of the country. This has been done every year, while the census of the population has been made every ten years. In many ways this registration of the number of deaths and their causes is more important than the census. The census shows us where and how much we are growing in numbers, how many marriages are taking place, in what kinds of business we engage, and many other items of interest. But it does not tell us what is causing people to die, where evil conditions exist, or what has been done or should be done to remedy such conditions. This can be done only by finding out the meaning of the mortality statistics and the changes in them from year to year.

The recent reports inform us that the great causes of death are the following: Heart disease, tuberculosis, pneumonia, kidney disease, cancer, cerebral hemorrhage, and the intestinal diseases of babies. These diseases together cause over half of all deaths.

Heart disease. Heart disease causes the most deaths of them all. It is causing more deaths now than it did a number of years ago. WHY? Prob-

ably because it is seldom fatal except in old age. On the whole people are living longer now than they did then, so that more in proportion have a chance to die of this disease. But many kinds of heart disease are due to the effect of various infectious diseases, such as scarlet fever, diphtheria, and tonsillitis. These may have occurred way back in childhood, but they have left a lifelong effect. It is therefore very possible to prevent a great deal of the heart disease when we prevent infections.

Tuberculosis, the Great White Plague. Tuberculosis is known as "the Great White Plague," and the name is well deserved. Even now it kills more white people than does any other germ disease. It might be called "the Great Black Plague" as well, for it seems to be even more fatal for the colored people in this country. Only a few years ago tuberculosis ranked even above heart disease as an enemy. It is especially severe with poor people and others who are poorly fed and who may live under unclean conditions. It is so common that it is difficult for the health authorities to be as strict as they might with those who have it, although a great deal has been done to help. In this country now deaths from this plague are only three fourths as frequent as they were fifteen years ago. As people come to know more about how it is spread, and are willing to have as strict steps taken as in such diseases as diphtheria and smallpox, it is probable that tuberculosis will become just as uncommon.

Pneumonia. You have often heard it said that pneumonia is caused by a chill or great exposure to cold. We now know that there is very little truth in such statements. There are several kinds of pneumonia, but all of them are caused by bacteria. Most of them are infectious diseases, just as much as are measles or typhoid fever. In certain cases it attacks us when we are weakened by some other disease, or overwork, or lack of proper food, but this is because there are usually germs of a comparatively mild form of pneumonia in our throats which do not harm us as long as we are strong and well. Most cases, however, are caught from some one else who has the disease. It has been found that much of the pneumonia can be prevented by a vaccine which is something like that used in preventing typhoid fever, and such vaccination has been effective among the soldiers in some of the camps where pneumonia was especially apt to occur. This method will probably be used much more generally as time goes on. Then, of course, if the same sort of care is taken of people with pneumonia, as of those who have other infections, it will have much less chance to spread. It was only a very few years ago that we came to know that it was "catching," but, even in the short time since, it has become much less a cause of death.

Kidney disease. While we are not sure that all kidney disease is caused by germs, we know that much of it is; therefore can be prevented. When doctors study the cases, they seem to be much more

frequent among those who have had infectious diseases when they were young, especially scarlet fever. So even in this disease right methods of living and guarding against infection will result in much less of it.

Cancer. Despite much scientific research, cancer still baffles mankind. Yet we do know that it is killing more people every year. The reason for this may be the same as that which we have given for the increase in deaths from heart disease—it is a disease of older people. We also know that a very large proportion of the deaths from it CAN be prevented; but in order to do this people must learn one thing. As soon as they find that they have a tumor, or swelling, or a sore that does not readily heal, they must go to a good surgeon, and be prepared to have it removed. The idea of an operation frightens some, but the knowledge that without it an incurable cancer may develop should lead any one to overcome fear. If it is done early, the operation is usually very simple, and in a few days the patient is feeling as well as ever.

Cerebral hemorrhage. This is often called apoplexy. It is due to a weak blood vessel in the brain, and is more apt to be a disease of quite old age. There are certain germ diseases, however, which are known to make it occur before it would otherwise.

Intestinal diseases of babies. Practically all deaths from this cause are a disgrace to civilization, and are caused by germs in milk or water or on

the food. This is being rapidly realized, and there is now hardly half as much as there was at the beginning of the century. It is to be hoped in the future such diseases will be unknown. They can be, if mothers will learn to do all that is now known in regard to preventing them.

Making a longer-lived and happier race. You will see from what has been said in this chapter that a great part of the deaths from all these great causes can be prevented. If we add to these the great number of other germ diseases and the preventable accidents which kill so many people, we can hope that in the future, when every one realizes these evils and takes a part in helping to stamp them out, almost every one will be able to live to a healthy, consequently a happy, old age.

CHAPTER XXXI

INDUSTRIAL HYGIENE

Making the factory fit the child. Fifty years ago it was taken as a matter of course that a shop, workroom, or factory could be a dirty, half-lighted, unventilated place. Dirt and grime were looked upon as a sign of industry. Both workmen and foreman were supposed to be superior to such affectations as keeping themselves, their benches, or their shop clean and tidy. The crude old proverb, "Where there's muck, there's money," was the motto of the day. Workrooms and shops were put in the cellar, the attic, tumbledown sheds, or old barns. If the place was n't dirty to begin with, it would soon become so.

Gradually, however, it began to dawn upon employers and workmen that if good work of any kind were to be done, it must be done in good light. If fine and delicate work were to be turned out, benches and material must be kept clean and free from dirt and grit. When machinery and fine tools began to be used, it was found that they wore out much faster if they were allowed to get dirty, rusty, clogged, and covered with dust.

Then it was noticed that whatever made dirt in a shop was either waste of material which could be

saved and used, or waste of fuel. Workshops began to be well lighted, well kept, and cleanly.

Last of all, — and not until within the last fifteen or twenty years, — it occurred to employers that the human machines which they were using would do better work and last longer if they were given plenty of light, plenty of air, and comfortable temperature, as well as being well fed, well housed, and not worked more than a reasonable number of hours a day. Even machinery must be given regular intervals of rest. It is now considered good business to make workshops as light, as well ventilated, as free from dust and poisonous fumes, and as well supplied with everything that promotes and protects the health of the workmen and workwomen, as it is reasonably possible to make them.

This is particularly true of shops, factories, and other establishments where children are employed. Children have less strength and less muscular endurance, and are far less able to resist the effects of bad air, overheating, poisonous dusts or smells, and confining and cramping occupations. It is not too much to say that to-day the standard of health officers, of intelligent business men, and of labor unions alike is to make shops and factories places which will actually protect and promote the health of those who work in them, instead of disease-breeders and death-traps.

Choosing a suitable life-work. It is very important that each child should choose work for

Courtesy Nat. Child Labor Com., N.Y.

FACTORIES THAT MAKE BAD CITIZENS

which he is physically, mentally, and temperamentally best fitted. It was formerly supposed that most children would make a fair success at almost any ordinary occupation, if they were sound mentally and bodily, and had a fair amount of time to learn the trade. Under this plan a general scheme of education was devised, and every child was compelled to take exactly the same training up to fourteen or sixteen years of age.

Now we know that we begin to show differences, fitting us for particular occupations and unfitting us for others, as early as the tenth or twelfth year. The widespread introduction into schools of manual-training shops and various forms of technical education is the result. The aim is not so much to teach each pupil some trade as to give him a chance to try his hand at a number of different trades in order to get some idea of which one will prove best for his life-work.

The hours of work and fatigue. One of the first things discovered when we began to study the human side of industry was that too long hours of work are a mistake from an economic point of view. When the waste products produced by muscular and mental work — known as the *fatigue poisons* — gather in the blood to a certain amount, the quality of the employee's work begins to run down rapidly, and it becomes necessary for him to rest until the blood can get rid of these poisons. If this is not done, one or all of three things happens: (1) The

workman begins to make mistakes in his work, which cost more than the results he is producing; (2) he begins to be slow and careless in his movements and is likely to get caught in the machinery; (3) the poisons, continuing to gather in his blood, attack the arteries and cause them to decay and stiffen, and the man is finally made unable to work.

The list of accidents in a factory proves this. Accidents are fewest in the morning, at the beginning of the day, although some are due to various difficulties in starting the machinery and getting under way. Then they increase steadily until the noon hour. After the noon hour there are fewer accidents, although not quite as few as in the morning, and from that time they increase steadily until the hour for closing, the largest number occurring always between five and six o'clock in the afternoon. In other words, the more tired the workmen are, the more likely they are to suffer serious accidents.

From twelve hours the day's work was shortened to eleven, then to ten, where it hung for a good many years, then to nine; while now the standard regarded as best for the efficiency of the factory and the health and comfort of the working-people is eight hours a day, with a half-holiday on Saturday. So much has the shortening of the hours improved the health, the vigor, and the mental alertness of the workmen, that even with the same machinery factories now turn out far more work in the eight-hour day per workman than they used to do when they worked for

twelve hours a day. Not only have wages not fallen with the shortening of the day, but they have steadily risen, with the net result that the men are working shorter hours, and the employers are paying higher wages, and getting a larger output per workman than ever before in the history of the world.

Ventilation and lighting of the shop. Plenty of good light is so necessary if good work is to be done and machinery is to be kept working well that our factories and workshops are now coming to be among the best-built and best-lighted buildings that we construct. Since we have learned how to build with concrete and steel and glass, the walls of the modern up-to-date factory are practically all windows, and they are more brightly lighted from every side than even the best of private houses or public buildings.

It has also been found that the expense of running, the danger from fire, and the difficulties in moving goods about from one department to another, in keeping materials clean, and in ventilating are so much increased by piling one story upon another that the best factories now are tending toward one-story or two-story buildings, with skylights in the roof, as well as glass walls. This requires a much larger area of ground on which to build the plant; and for this reason our factories which, thirty years ago, were crowding into our cities, are now leaving them and moving into thinly settled suburbs or into the open country. Transportation of raw materials and of finished products has become so much cheaper

and swifter that factories can establish themselves where they please. The advantages of one-story or two-story buildings, with electric tramways connecting all departments, freedom from dirt and dust, good light, good ventilation, and better living and housing conditions for their employees, make the suburb, the village, or the country far preferable to the great city. Light and air go hand in hand with health and good work.

Since proper smoke-consuming methods have be-

THE RIGHT KIND OF WORKROOM

Notice the broad aisles, the big windows, the well-shaded electric lights, the clean aprons, the white walls, and the general look of neatness and cleanliness. The modern manufacturer knows that these things make the workers happy and well and increase their output.

come common, the clouds of smoke and soot which used to be considered part of a factory town have disappeared. Moreover, our factories now are built of glass and iron and steel, set in ample, park-like grounds, with the buildings surrounded by grass, shrubs, and flowers. They are being made as attractive as a college campus or city park. Every scrap of carbon and soot which blackens the skies and makes our houses dingy is so much good fuel gone to waste. Manufacturing towns may be made as spotless, wholesome, and beautiful as the prettiest residence village, not only without loss, but with profit to everybody concerned.

Guarding against accidents. The best protection against accidents is reasonable working hours, good ventilation to prevent fatigue, and good lighting to prevent mistakes from inability to see clearly. Next after this come proper guards for the dangerous parts of machinery, such as cogs, gears, and belts. The number of workers killed in our factories every year is enormous. The estimates run anywhere from twenty to thirty thousand; and a large percentage of these lives could be saved by proper equipment and care. Almost every factory where healthful hours of work have been instituted, good light and air provided, and proper guards installed over machinery, has shown a decrease in the number of accidents. In some cases the decrease has amounted to a half, or even three quarters of the former number. The proper covering of machinery also protects it against

dust, dirt, and accidents, so that it keeps in better condition and lasts longer. Again, life-saving and health protection go hand in hand with good business practice.

Guarding against fire. The most dreaded accident of all in factories is fire; and all states and cities now insist that factories where many employees work shall be so built, and so provided with stairways, fire-escapes, fire-hose, and sprinkler systems as to reduce the fire-risk to a minimum. Many of the older factories, which were started in a shed and expanded by the addition of other sheds as the business grew, were the deadliest of fire-traps; and a certain class of ignorant, greedy, short-sighted manufacturers, until they are forced by law to improve their plant, will continue to keep buildings of this kind, or to crowd workers into rooms where there are no adequate stairs and fire-escapes.

But the better and more intelligent manufacturers have discovered that good protection against fire is one of the best possible investments. If the workers know their factory is of fireproof construction with plenty of stairs and fire-escapes, they will stay to fight a fire instead of making a panic-stricken rush for the stairs the moment the first burst of flame or smell of smoke is noticed. The new methods of construction with steel and cement and glass lower the fire-risk greatly; and when the buildings are only one or two stories high, they are even safer. In fact, a thoroughly up-to-date, well-planned, modern fac-

tory building is now safer from fire than an average private home.

Dangerous fumes, dusts, and lints. Another serious danger to the health of working-people is that the goods manufactured in many industries give off dangerous or poisonous fumes, or clouds of steam, or choking dust, or fill the air with a fine lint which blocks up and irritates the nose and throat. Some of these fumes are poisonous, such as the fumes of certain kinds of phosphorus used in making some matches, or of lead in the manufacture of paints, or the glazing of certain kinds of pottery. Poisonous fumes first attracted our attention to the diseases known as *diseases of occupation*. When the question was first studied, it was found that thousands of workers every year were being poisoned by lead in the potteries and paint factories and by phosphorus in the match factories.

The lead fumes produced violent attacks of pain in the stomach and intestines, known as *lead colic*, followed by paralysis of the nerves, particularly of the hands and wrists, but finally extending to all the nerves of the body, including the optic nerve, and producing blindness. The commonest paralysis, however, was of the muscles of the forearm so that the hands could no longer be lifted at the wrists, but hung down limp. This was known as *wrist drop*.

Phosphorus poisoning attacked the teeth and jaws of workers, producing decay of the bones of the jaw and face, known in the mills as *phossy jaw*. When it

was first attempted to pass laws to avoid this horrible poisoning, some manufacturers bitterly resisted them, declaring that they were necessary risks of the trade, and if the employees did not care to run these risks they could seek another job. However, the fumes of phosphorus could attack the jaw only through the ulceration of the gums surrounding decaying teeth; and when the manufacturers were compelled to supply dentists and have their employees' teeth examined and repaired at regular intervals, the amount of "phossy jaw" was lessened. A little later it was found that the use of red phosphorus in place of yellow would do away with the fumes altogether, and most matches are now made with red phosphorus, so that "phossy jaw" is rare.

In the case of lead poisoning, it was found that the greater part of the poison was carried into the system of the workers, not in fumes in the air, as had been supposed, but in the food eaten at lunch-time in the factory. Lunches were eaten without the lead being thoroughly washed and scrubbed off the hands of the employees. When wash-rooms and lunch-rooms were provided, lead poisoning was cut down to less than one fifth of its former proportions. By forbidding its use as a glaze in potteries, and compelling the manufacturers to seek a non-poisonous substitute, it has been largely brought under control in this industry. Nearly the same results have been attained in the case of most of the other poisonous fumes or dangerous dusts and lints.

Courtesy Town Room, Boston.

THE RIGHT KIND OF WASH-ROOM

This is a factory wash-room. Notice the cement floor, the clean basins, the hot and cold faucets, the individual towels, and the shower baths. Do you approve of the hairbrush and comb? What do you think about the drinking-cups on the shelf?

Where gases are given off in certain stages of manufacture, hoods are provided to cover the tables or forges or retorts causing the fumes, and by means of a fan these fumes are sucked up into chimneys and discharged into the open air. In other cases the fitting of proper screens, or the wearing of masks by the workers, prevents most of the danger. Lints and fine dusts can be made less harmful by keeping either the fabric or the air of the room charged with a fair amount of moisture. In fact, there is scarcely a dirt

or a dust or a gas which cannot be dealt with in such a way as to make the air of the room fairly wholesome and safe to breathe. The improvement in the comfort of work, the quality of the goods turned out, and the lessening of accidents is so great that employers would not do without them when once they see the results of their use.

Lunch-rooms, rest-rooms, and wash-rooms. Many of the employees in factories live so far away that they must bring their lunches with them, and it is found that eating these lunches with unwashed hands in the back yard or the workrooms is one of the commonest ways of making them sick. The health authorities suggested that special lunch-rooms should be provided in factories. This prevented so much sickness and improved the health and comfort of the employees so greatly that most of our factory laws now require that a certain number of lunch-rooms, and a certain number of wash-basins with hot and cold water and soap, shall be provided for every fifty to one hundred employees engaged in each factory.

In addition to the protection against disease and the loss of time through illness, the cleanliness and comfort given working-people by wash-rooms, toilets, and lunch-rooms improves the quality of their work and keeps the materials cleaner. Therefore, a modern, progressive factory equips itself with attractive lunch-rooms and toilet-rooms, with modern conveniences, provides rest-rooms, and often

reading-rooms, for the use of the employees during the noon hour. These latter are often kept open after closing time for those who wish to read magazines or draw books to read at home. Some great business organizations and many department stores employing thousands of young people have actually provided concert halls and dancing-floors for use in the noon hour. Many of the leading manufacturers provide athletic fields, and not a few of them provide tracts of land which can be divided into gardens and used by the children of their employees.

These far-sighted, broad-minded, successful employers assure you that this is simply good business.

HOW A FACTORY FEEDS ITS MEN

This modern factory has kitchens and dining-rooms where good wholesome food is furnished at cost to its workers. Would you rather eat here or bring a cold lunch in a pail? Which do you think is better for the workers?

Courtesy Town Room, Boston

FACTORY DOCTOR AND NURSE AT WORK

Accidents and sudden illnesses are treated in the emergency room.

It attracts to them the most intelligent class of labor; it lessens loss of time through illness of skilled workers; it increases the working power of employees by making them healthy, happy, contented, and interested in their work, and it gives employees an interest in the success of the business and makes them willing to do everything they can to increase its output and improve the quality of the goods.

The factory physician and nurse. One of the most helpful agencies in industrial hygiene has been the factory physician and the factory nurse. These were first provided many years ago mainly for the purpose of giving surgical attention to such serious accidents as might occur in the factory. Then their services were extended to all sorts of cases and all kinds of illness occurring while the employees were in the factory, and finally led to watching the sanitary conditions of the rooms and machinery, the physical conditions of the workers themselves, and the health of their homes.

Among most of the European nations every one who applies for work in a factory or business is given a careful physical examination by the factory physician. If he has any serious disease he is promptly referred to a government hospital or sanitarium, where he is taken care of without charge until he is cured, and his family is supported in the mean time. If there is something about his health which makes it dangerous for him to engage in this particular trade, he is advised to try some other industry. If

he is considered suitable for the work, he is assigned to the particular branch of the work for which his previous training and physical condition seem best to adapt him.

The largest factories now have a nurse for each two or three hundred employees, and a doctor for each thousand. Both doctor and nurse are constantly on duty at the factory, with a dispensary, small surgery, and usually one or two beds where cases of sudden illness can be cared for until removed to their homes. Every employee who seems ill on coming to work, or who is noticed by the foreman or nurse as looking tired at his work, is promptly sent down to the doctor's office for examination. Every accident, no matter how slight, — a cinder in the eye, a bad scratch on the hand, a crushed finger-nail or toe-nail, — is at once treated. In factories which have adopted this plan, the number of days' time lost from illness in the working force has often been cut down to one half or even one third of its former amount.

CHAPTER XXXII

TRAFFIC, SMOKE, AND LIGHTING

Safety first. Up to fifty or sixty years ago, roads and streets, whether in town or country, were open, leisurely, friendly places, where one could stroll up and down, or walk, or even sit in the gutter and play with comparative safety. But when thousands of people began to live upon a few acres, and poured down a single street to reach their work every morning and back again in the evening, while their supplies and letters and shipments of goods rolled through it in a steady stream all day long, a street became a place of danger.

In all our greatest cities to-day, on both sides of the Atlantic, the roaring avalanche of traffic which pours constantly down the trunk-streets has become so dense that special traffic police have been trained to handle the crowds of passengers and vehicles. At the intersections of the principal streets every thirty to sixty seconds the traffic policeman lifts a gloved hand, dams up the stream of traffic first in one direction, then in the other, until the waiting foot passengers can stream across the street. By this careful policing, the busiest streets of our largest cities have become actually the safest. It is in the smaller and less frequented streets, where there is no policeman

to guard foot passengers or to insist that the speed limit be observed, that there is the greatest danger of street accidents.

While the chief responsibility rests upon the driver of the vehicle, whether automobile, wagon, carriage, or truck, and the law makes it clearly his duty to see that he does not run down and injure foot passengers, however careless or stupid they may be, yet a considerable percentage of accidents is due to carelessness, ignorance, or recklessness on the part of foot passengers. This danger, although greatest in cities, is by no means confined to them. Ever since the introduction of the motor-car country roads have become places of serious danger, so that it is well worth while to develop a safety code for crossing streets and much-traveled roads in both country and city. In any case, it should be made a matter of second nature never to cross any street without first looking carefully in both directions. In the days of slow-moving, horse-drawn wagons or drays, you could get across the street before anything which was fifteen or twenty yards away could run you down. But now a fast automobile, which is three blocks up the street when you step off the sidewalk, has time to hit you before you can cross. When you see an automobile or a trolley car coming, never undertake to run across the street in the foolish hope of "beating it." Fully two thirds of the serious accidents due to the fault of foot passengers occur from this senseless habit, especially when crossing a city street where

there are two streams of traffic coming in opposite directions. A foot passenger sees a wagon coming from his left, makes a rush to get across in front of it, and lands squarely in front of another vehicle coming from the opposite direction. Never on any account hurry across a street, or put your head down and make a dash for the other side.

Everybody looks both ways before he crosses the street, or at least imagines that he does; but another precaution not so generally recognized is that of listening carefully. The chief reason why we have two ears is that we may be able to judge of the direction from which sounds are coming. When you have once satisfied yourself by a glance of the position of the nearest wagon or automobile in each direction, and have started across, your ears will warn you if either of the vehicles which you have noticed quickens its pace, or if any other swiftly moving vehicle runs into the danger zone. In fact, the safest way to cross a busy street is to choose your time carefully, and then, looking steadily ahead, walk straight forward, listening with both ears. Glancing too far to one side or the other after you have started to cross is almost as dangerous as putting your head down and rushing. Your ears, if in proper condition, will warn you of any danger in plenty of time to jump or turn your head. If you move steadily and quietly, with all your wits about you, looking as if you knew exactly where you were going, almost any driver or chauffeur will be able to avoid you. But if you start

with a wild rush, lose your courage halfway across, dart back again, jump sidewise, and start ahead again, the most skillful and careful driver may run over you in spite of himself.

Street-cars and omnibuses. A special code of safety has grown up for street-cars and omnibuses. These vehicles are limited to a certain route and stop at regular intervals. On this account they can be more easily avoided than free vehicles ranging over the pavement. A few simple rules should be carefully observed: —

First, never on any account stop upon a street-car track, even though the car is nowhere in sight. *Never* play on it.

Second, remember if you are two feet or more away from the track, you are as safe from the oncoming car as if you were on the sidewalk.

Third, remember whether trolley-cars stop on the near or the far side of the street, and guide yourself accordingly in crossing in front of them. Most city ordinances require street-cars to stop on the near side of cross-streets, because that gives both foot passengers and vehicles a safe opportunity to cross that street while the car is stopped. When pavements were poor and streets were muddy, this near stop landed the passengers twenty or thirty feet away from the crossing. But with the introduction of well-kept pavements, this objection has disappeared.

Fourth, bear in mind always to wait until a car stops before stepping off the platform, to step off

facing toward the front of the car, — in the direction in which it is moving, — and to hold on firmly with the hand nearest the car until the foot strikes the ground. It is also well to look in both directions, especially behind the car, to see that no other vehicle is coming rapidly in the same direction so as to overtake the car and put you in risk of being run over when you step down on the street. This is a common cause of serious accidents, and many cities compel all vehicles to slow down or stop when a car is stopping ahead of them, or to drive wide of it so as not to endanger alighting passengers. Unfortunately, this law is not always observed. It is also well to insist that the conductor bring the car to an absolute stop before you get off at your crossing. A slight disturbance of your balance may cause a dangerous fall, especially upon the hard pavement. The spill is so sudden that usually one has no time to throw out a hand to save one's self, and is likely to strike with full force on the shoulder, back, or head. A fall from shoulder height to the pavement is quite sufficient to fracture the skull. It is also dangerous to attempt to get on cars while they are in motion, because if you do not succeed in reaching the step at once, you are likely to be dragged by your hands and probably jerked under the rear wheel of the car.

Rules of the road. If you ever drive a horse or a motor-car, it is most important to observe strictly the rules which have been laid down as a driving code. You must know all about the proper side of

Courtesy N. J. Public Safety Commission

DON'T PLAY ON CAR-TRACKS

Cars cannot always stop quickly, and a lost arm or leg may be the price of a few minutes' thoughtless play.

the road, stopping, turning, and slowing down. In most civilized countries, except England and Russia, it has become first an unwritten and then a written law that all drivers of moving vehicles shall keep to the right when meeting one another; and must drive down the right-hand half of the roadway in crowded streets. In England and Russia it is the rule to turn to the left and to keep to the left-hand side of the roadway. Nobody knows why either rule was adopted in preference to the other. A strict observance of this rule makes it not only much safer for vehicles, but also for foot passengers. It is also required that when a driver is going to slow down or stop at a house or shop, he shall throw up his right hand with the fingers extended so as to warn those coming up behind him. The same warning is required in cities when he is about to turn a corner and drive into a cross-street.

It is probably only a question of time until most of our heavy hauling traffic will be put underground or in viaducts below the street level. Much of the heaviest traffic is now handled between ten at night and six in the morning. Automobiles in the future probably will have special roadways of their own, as railroads now have, and will be compelled to keep to them for all long journeys and for all speeds above seven or eight miles an hour. To-day foot passengers, who comprise at least nine tenths of the community, have been almost deprived of all rights in the streets beyond the sidewalks.

Street-lighting and health. The habit of lighting city streets was established to enable people to see their way about at night without stumbling over things or running into other persons. Good lighting also rendered streets pleasanter to live on. Still, people grumbled about the expense until it was discovered that the well-lighted streets were not only safer from accident and pleasanter, but also robbery, street rows, mischievous destruction of property, and crime of all sorts became very much less common. Just as it was found that it was cheaper to leave lights burning all night in a store or bank than to employ bolts, shutters, and watchmen, and that lights protected property from burglars and petty thieves much more effectively, so it was found that good lighting of a district greatly lessened crime, especially when extended to the city streets and alleys. It is said that ten street-lamps equal one policeman for the protection of property and the prevention of disorder.

Well-lighted streets were also found to be a protection to health in several different ways, some of them quite unexpected. Light put a stop to the insanitary practice of throwing garbage, waste material, broken crockery, ashes, dead cats, and other refuse into the streets under cover of darkness. Even after it had come to be considered bad form to throw waste and rubbish out in front of your own house, it still remained a common habit to carry them to the back of the lot or round the corner into

the nearest dark side street or alley and there dispose of them.

Another way in which plenty of street light protected health was by encouraging people to leave their windows open at night. Although part of the old dislike of leaving windows open after dark was the fear of drafts and cold, a considerable part of it was dread of burglars. In addition to this, lighting of all sorts is an enemy of disease germs and decay, for, as we have already seen, a natural antagonism exists between light and dirt. No street or room which is not well lighted has a chance of being kept decently clean.

The smoke nuisance and health. Though most of our artificial lighting is done at night, there are conditions in certain parts of our great cities which frequently make it necessary to illuminate buildings and light street-lamps during daylight hours. These are the clouds and fogs due to coal smoke and soot in the air. It was at first thought that these immense clouds of smoke and soot produced their greatest damage by inhalation into human throats and noses and lungs.

Curiously enough, it has been proved that although smoke and smoke fog increase the liability of city people to consumption, the worst effect upon health is produced by the consequent cutting off of sunlight. Observations by the Weather Bureau show that in the winter months the amount of sunshine enjoyed by the downtown parts of some of our large

cities is less than half that of the open country; and as this is often little enough in winter, it is a serious loss. Every siege of the famous London fog lasting two days or more is invariably followed by a distinct rise in the rate of deaths from all causes, particularly among the old and enfeebled, or those already in a late stage of some serious chronic disease. The depression of vitality due to the cutting-off of the sunlight is just enough to turn the scale in these cases.

The amount of soot thrown into the air, as shown by spreading sheets upon the roofs of houses or in vacant lots in the down-town parts of cities and measuring the thickness of the layer of grime deposited upon them

Courtesy Nat. Child Labor Commission

THE RESULT OF SLIPPING BETWEEN CARS

This boy worked in a Pennsylvania coal mine, and got his leg crushed between two cars. But a street-car can do it just as surely.

in a week or month, is appalling. It reaches the enormous amount of from two to seven tons to the acre! The thought of living and breathing and eating and sleeping constantly in such an atmosphere makes us shudder. When we add to this interference with health the annoyance of the griming and smearing of buildings, the coating of sidewalks, the blackening of curtains, carpets, clothing, and all delicate fabrics, and above all the obstacle this rain of soot offers to keeping our windows open, it is clear why the problem of checking the smoke nuisance has been taken up so energetically by health officials. Like most improvements, the prevention of smoke is expensive at first, but it pays in the long run. It distinctly lowers the death-rate and the disease-rate of the city, makes life far more comfortable and enjoyable, and restores the possibility of beauty to city streets and houses. Moreover, every particle of soot in the air means so much good fuel gone to waste. All engines and furnaces should be equipped with smoke-consumers. These are most commonly operated by driving the smoke as it first comes from the furnace through a return flue back to the fire grate, where it goes through the hottest part of the fire again, this performance being repeated as often as is necessary to rid the smoke of all its combustible carbon particles. By this process a chimney of a great furnace or factory may be made to give off practically no visible smoke.

CHAPTER XXXIII

HOW CHILDREN CAN HELP THEIR COMMUNITY

The best thing children can do. As we have seen there are many ways in which the citizens of a community can help it to keep clean, healthful, and beautiful; and every one of the things they do for the sake of the community will benefit them personally almost as much as it benefits the town or city.

Of course, the people who can help the community most are the town or city officials — the mayor, the aldermen, the board of health, the city physician, and all the other people who see that our city or town is well paved, well lighted, and supplied with good water and sewer systems; that our garbage is collected, our air is kept free from smoke, and our lives and property are protected. When we are grown up, we can help our community by voting for intelligent and good men who will fill their offices in such a way that all these things are supplied to the community. Still, we do not have to wait until we are grown up to help our community. There are a great many things that can be done by children — even very little children — in the home, in the school, and in the city or town.

The biggest and best thing that we can do is to keep healthy and vigorous ourselves. We are going

to be citizens of our community some day, and we want to be the best kind of citizens. We must eat plenty of good food, play at least two, or, better, four, hours every day in the open air, get plenty of sleep, keep our bedroom windows open, and see that our hands, faces, and clothes are reasonably clean.

Keeping ourselves clean is really the beginning of keeping our community healthy. A good example is as "catching" as measles. If we look clean and fresh and wholesome ourselves, we will make everybody else want to have himself, his house and garden and street look clean, too. Sometimes it seems hard to wash, especially if our hands are chapped, and the soap makes our eyes smart when it gets into them, and the towel is rough, and the water is cold. But if we will only keep on doing it for a few months for the sake of looking well, we will find that it feels so pleasant to be clean that we actually enjoy it. We will be uncomfortable if we do not get our morning bath, or if we happen to omit brushing our teeth, or if we cannot wash our hands before a meal.

If you keep your face and body clean, you will soon want to keep your clothes fresh and clean to match, and you will be surprised how particular you will be about clean shirts and collars. Of course, if your hands are grubby and your face grimy, and you can't tell what color your skin is for the dirt, you won't care what kind of shirt you have on.

Keeping the house healthful. If you are clean yourself, you will want to live in a clean and orderly

house. Of course, you had little to do with the building and planning of it, or the arrangement of its doors and windows, or the size of its rooms, or the way it stands on the lot. Still, it is n't altogether the way a house is built that makes it healthful or unhealthful. It is largely the way it is lived in; and the children of a house have a great deal to do with the way it is lived in and the condition in which it is kept.

First, you can keep the windows of your own room open, and when you notice that the air of any other room is stuffy and hard to breathe, you can ask your mother or father if you may not open the window a little while. You can keep the outside doors shut as you run in and out, and always shut the screen door to keep out flies and mosquitoes. You can remember that there is a thing called a doormat laid in front of the door on which children can rub off the mud and dirt from their shoes instead of tracking it into the house to dry and fill the noses and lungs of the family with irritating and unhealthful dust. All these things will keep the air of the house pure.

Second, you can keep your own things in order. Perhaps you don't exactly see how this can help anybody to be healthy. But an orderly house is nearly always a healthful house, and no house can be orderly unless all the people in it take care of their things. If you keep your books and papers and toys in the playroom, or in your special place in the living-room, and if you do at least the most "littery"

part of your whittling and carpentering in the woodshed or barn or workshop, you will not only save your mother a great deal of work, but you will make the house much more pleasant and wholesome.

Third, you can keep the bathroom tidy. If you will wash your face and hands in the bowl, instead of on the towel; if you are always careful to pull the plug out of the washbowl or bathtub and rinse them with clean water after you are through washing; if you will remember not to walk over the bath-mat with your dirty shoes; and if you are careful to keep your toothbrush, toothpaste, and soap always clean and neat, you will do a good deal to help keep the bathroom clean and wholesome. When you have a cold, you should wash in a separate basin, so as not to infect the other members of the family.

Fourth, you can keep the yard clean. If your back yard is n't as clean and orderly as it really ought to be, a Saturday afternoon clean-up and bonfire is not only good fun, but good community hygiene. Get your brothers and sisters to help you, and ask father or big brother to come home early and help you light the bonfire. Mother will be glad to have you do it, but of course you must ask her first.

After the yard has been cleaned up, you can keep it clean with very little difficulty. If you see any dirt or rubbish or trash lying about the garden, or the lot, or the barn, take a stick or a barn fork, pick it up, and throw it into the garbage-can, or on the manure-heap, or into the rubbish-furnace if you have

Courtesy W. H. Manning, Boston

Courtesy W. H. Manning, Boston

Courtesy Nat. Housing Assn. N. Y.

HOW TO RECOGNIZE A BADLY KEPT CITY

one. A very little trouble of this sort once or twice a day, or even two or three times a week, will make all the difference between a dirty, untidy, unwholesome yard and a clean, attractive, wholesome one where everybody likes to come and play.

If you help mother with the dishes, you can do a good deal to help keep the kitchen wholesome. In chapter IV you learned how dishes should be washed and the sink kept clean. You can do the dishes that way, and not leave kettles to soak overnight, or scraps in the sink strainer to sour, or stale food in the refrigerator. You can keep the faucets polished bright, and the dishpan clean and shining, and the woodwork around the sink as white as soap and scouring can make it. Sometimes mother is so busy that it is hard for her to find time to scour the stove and scrub out all the corners of the refrigerator as often as she would like to do, and she will be glad to have you offer to help.

All these things do not sound hard to do, and they do not take much time, but they make a great deal of difference in the happiness and health of the home.

Cleanliness in the school. In the schoolhouse most of the arrangements for light, ventilation, and cleanliness are made by the teacher, the school doctor and nurse, and the janitor; yet there are several things the children can do to help.

For instance, it is much easier for the teacher to keep the schoolroom properly ventilated if the children sitting in parts of it that are not getting enough

fresh air will report the fact to her pleasantly and courteously and ask to have a window open near them. Again, if the light is too dull or too dazzling, don't hesitate to let your teacher know it, and she will be glad to arrange the light for you, or let you change your seat, or, if the lighting condition is very bad, to report it to the janitor or the school board. Or if you have trouble hearing, you should report that to her also, and she will see that the difficulty is corrected. You should also report to her if you do not feel well — if your throat is sore, or your head aches, or you feel hot and feverish. Perhaps by doing so you may save other children in your class from catching some infection from you.

Another thing you can do is to be quiet about the school halls. You can make a great deal of difference in the comfort of other people by the way in which you come in at the front door, walk through the halls, and avoid banging doors, shouting, or loud talking.

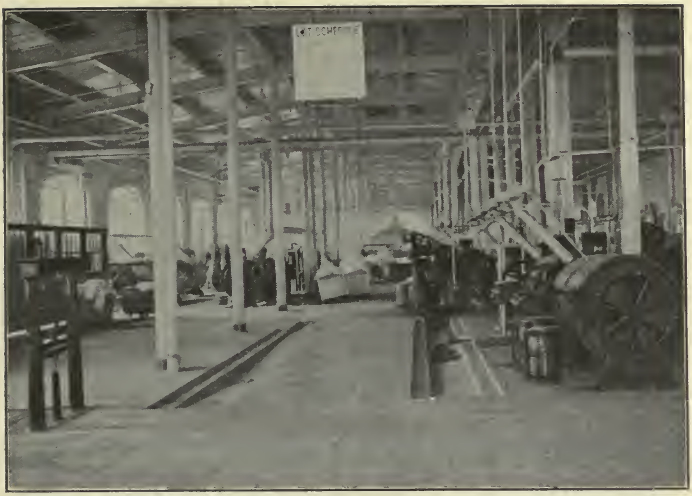
The condition of the toilet-rooms, cloak-rooms, and rest-rooms depends on you. The plumber may put in the most modern sanitary conveniences, and the janitor and matron may do the best they can to keep them clean and tidy, but the personal carefulness of the children who use them is what really keeps them in healthful condition. You can keep from throwing apple-peelings, papers, and scraps of sandwiches about when you eat your luncheon. You can pick up trash that other people have been care-

less enough to leave, and call their attention politely to the need of everybody's helping to keep the school-building attractive. If there is not a waste-basket or scrap-can in which trash can be put, you can ask the janitor pleasantly and courteously for one, and you can help to see that it is used properly.

Another thing that largely depends on you is the condition of the paint and kalsomine on the walls of your schoolroom and in the halls. You like to have pictures, flowers, and aquariums to make attractive the room where you spend most of your day; but you cannot make it look really well if the walls are scratched, the plaster is broken, and the paint marred.

The school health society. Children can do so much to help keep the school-buildings, rooms, and playgrounds in healthful condition that some schools now are organizing children's health societies which meet once a week to discuss the conditions of the building and grounds and appoint committees to look after them. One committee has charge of the playground; another, of the basement; another, of the halls and stairways; another, of the toilets, and so on. Sometimes one child is appointed health officer of the school for a week or a month, and he or she oversees these committees and the care of the building and grounds in general.

If the committees find that any child is untidy or careless about the building, or if any bad condition is found in the basement, playgrounds, or shops,



Courtesy Pilgrim Laundry, Brooklyn

Courtesy Consumers' League, N.Y.

RIGHT AND WRONG KINDS OF LAUNDRIES

they report it to the health officer. He reasons with the offender, explains tactfully that such bad conduct is hurting the whole school, and tries to make him see the need for "team-work" in making the school a healthful place. If this does not make the offender do better, the health officer reports the matter to the next meeting of the health society, and action is taken by the school as a whole. Sometimes if the case is sufficiently important, a court is organized and a regular trial held, with judge, jury, and witnesses.

Of course, such an organization must be careful not to interfere with the rules of the teachers and the sanitary officers of the school board. If tact and courtesy are used, it becomes one of the best possible helpers of the teachers and school board.

In the broader community. Outside of the home and the school, children can also make themselves a help to the community, or by careless and insanitary habits can add to the difficulties of the officers of the board of health.

Take the question of pure food. No matter how many or how active the city food inspectors may be, they cannot possibly be everywhere at once. It helps them greatly if children notice where dirty or decaying fruits, vegetables, or meats are exposed for sale, or hawked from hucksters' carts, and report the offenders. In your report you should give the name of the store, its street number, and a list of the bad fruits or vegetables or meats that you saw. If you

are reporting a huckster's cart, take down his license number, which is on the side of the wagon. If you have a pencil and a piece of paper, it is better to write all these things down at once, so that you can be sure you are right. Report the case to your family, or to some policeman, or to the health department itself. Your father or mother or teacher will help you write your letter to the health department.

The most useful service children can render to the community, however, is in keeping streets and alleys clean. A corps of volunteer inspectors composed of school-children can do more than grown-up inspectors can. There are many places where a health officer seldom goes unless his attention is particularly called to them; but children go everywhere. If they get into the habit of seeing that back alleys, barnyards, and vacant lots are kept clean, and of reporting them to the police or health department when they are in bad condition, it will not be long until the neighborhood and perhaps the town has a thorough cleaning-up. Of course, this inspection must be done carefully and tactfully.

Park and playground cleanliness. One of the reasons why it took so long to get the city to throw open its parks and public gardens to children as play places was that the city officials did not believe children would treat them properly. Children, they thought, would break the branches of expensive shrubs, trample carefully tended flower-beds, kick holes in the sod, and throw papers and trash on the

walks. It is not too much to say that most of a park's attractiveness and most of the pride which the community takes in its park systems depend on the way they are used and kept by children.

Most children are careful of the city's property, and understand that when they go to a park, they are the guests of the city and have no more right to damage it than they have to damage a neighbor's garden or grounds. Unfortunately, there are some few children who do not understand this, just as some children in school take no pride in keeping the schoolroom and playground clean.

One of the things you can do to make your community attractive and healthful is to use the park properly whenever you play there, and to try to get other children to do the same. If you take a pride in the cleanliness and order of your park playground and wading or swimming pool, and if you will report to the park police any one — child or grown-up — whom you see abusing the hospitality of the city by ill-treating its property, you will do a real service.

As we have seen, community hygiene deals with common, simple, ordinary things. Cleanliness, orderliness, wholesome living — these make us strong and healthy and our community a pleasant place in which to live. If we will always do the things that make us well and happy, and never do anything that might make us or other people sick, uncomfortable, or unhappy, we shall have a far better community and far better citizens than we have now.

Courtesy Soc. for Control of Tuberculosis, Boston

THE REST HOUR IN A DETROIT SCHOOL

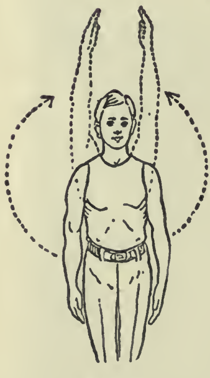
After luncheon a comfortable nap on your own cot under your own blanket makes you fit and rested for the afternoon's work.

SETTING-UP EXERCISES[1]

BY

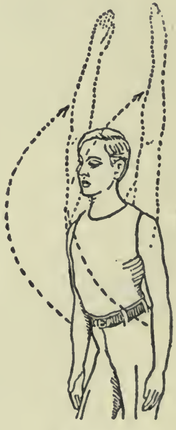
GEORGE J. FISHER, M.D.

Secretary, Physical Department International Committee
Young Men's Christian Association



EXERCISE 1

Position: Heels together, arms down and at sides, palms in.
Movement: Swing arms sideways, upward to vertical, and return.



EXERCISE 2

Same as Exercise 1, except that arms are swung forward, upward to vertical.

SETTING-UP EXERCISES

[1] From the *Official Handbook for Boys*, Boy Scouts of America. Used by special permission

EXERCISE 3

Position: Arms extended to side horizontal.

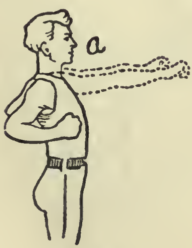
Movement: Swing forward and return.

(Emphasis upon backward movement.)

EXERCISE 4

Position: Arms at side, horizontal, back slightly arched.

Movement: Circle arms backward.



EXERCISE 5

Position: Forearms flexed at side of chest.

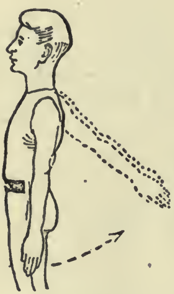
Movement: Thrust arms forward and return.

EXERCISE 6

Position: Arms at front, horizontal, forearms flexed, fingers on shoulders.

Movement: Swing backward to side, horizontal in position.

SETTING-UP EXERCISES



EXERCISE 7

Position: Same as Exercise 6.

Movement: Swing downward, forward, bringing arms beyond sides of body. Rise on toes with end of backward swing.

EXERCISE 8*a*

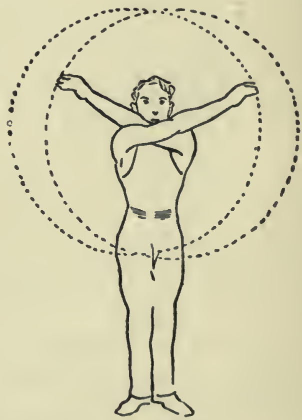
Position: Arms at vertical, thumbs locked, head fixed between arms.

EXERCISE 8*b*

Movement: Bend forward as far as possible, without bending knees, and return.

EXERCISE 9*a*

Position: Arms at vertical. Repeat exercise 8*b*.



EXERCISE 9*b*

Movement: Arm circles, downward, inward, across chest. Reverse the movement.

SETTING-UP EXERCISES

EXERCISE 10

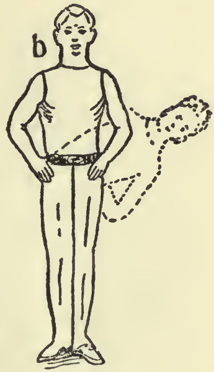
Position: Hands on hips.

Movement: Forward bend.

EXERCISE 11

Position: Same as Exercise 10.

Movement: Backward bend.



EXERCISE 12

Position: Same as Exercise 10.

Movement: Sideward bend, right and left.

EXERCISE 13

Position: Same as Exercise 10.

Movement: Rotate body at waist.

EXERCISE 14

Position: Same as Exercise 10.

Movement: Raise high on toes. (Hold shoulders back firmly.)

EXERCISE 15

Position: Same as Exercise 10.

Movement: Full knee bend.

SETTING UP EXERCISES

QUESTIONS

CHAPTER I

WHAT does it mean "to be healthy"? Why is it wrong to be sick, if you can avoid it? Mention some things you like to do when you are well and strong, but do not like to do when you are sick. What must you do to be healthy? How can you make work a pleasure? What are some of the things that are necessary to health that we like to do? Mention some unwholesome things that are sometimes difficult to avoid. How may you avoid worry about your health? What is meant by calling "health and happiness first cousins"? What besides machinery, looms, mills, and factories have "money value"? Name fourteen things that make a nation wealthy. Which of these things is most important? What is the "money value" of your own life? Mention some ways in which the community is protecting the health of the people. Whom besides yourself is the State interested to keep healthy? How is the health of workers protected? Mention one way to prevent poverty in your own family and in the community. How can you help to make this world a comfortable and happy place in which to live?

For community study

How much does it cost to have the doctor make a visit to your house? How much does it cost to have a tooth filled? How much does a toothbrush cost? Find out one thing that is done in your home to protect the health of the family. Find out one thing that is done by the community in which you live to protect the health of all the people.

CHAPTER II

What are the four causes of health? How much longer do people live to-day than they did one hundred years ago? Why do they live longer now? What is one way of finding out whether or not a thing is good for you? What is the "Panama Canal Zone"? Where is it? What were the health conditions there when the United States began to dig the canal? What did General Gorgas do to protect the health of

the workmen in regard to food? In regard to drinking-water? What was the result of General Gorgas's efforts to protect the health of the workmen? How can the town or city where you live be made as healthy as the Canal Zone?

For community study

Find out one thing done by General Gorgas in the Canal Zone to protect the health of the workmen that is also being done by your town or city government. Find out one cause of disease in your community that General Gorgas found in the Canal Zone.

CHAPTER III

Name some of the things we do by instinct to keep well. If you "catch" a disease from some one else, what kind of a disease is it called? What is a common sign of an infectious disease? Are all infections dangerous? Describe the strange ways in which some of the infections act. How were germs first discovered? What are germs? How do they pass from one person to another? How do germs cause fever? When the fever grows less, what is happening to the germs? The body is made up of cells: how are they put together in the body? How do the cells compare with the germs in size and in strength? When germs enter your body what do the cells try to do to them? How can we get rid of infectious diseases? Why is it necessary to drink pure water? How do mosquitoes become disease-carriers? How did General Gorgas protect the people in the Canal Zone from mosquitoes? When the mosquitoes no longer bit the people, what happened? How was the spread of consumption stopped? How was the spread of pneumonia stopped?

For community study

With which of the "rocks in the stream of life" that the chapter mentions are you familiar? How may you avoid "catching" cold from a person who has it? How may you avoid "giving" your cold to some one else?

CHAPTER IV

What makes a kitchen attractive? Why should the stove occupy the place of honor in a kitchen? Draw a diagram of the kitchen described in the third paragraph. What is "the heart of the kitchen"?

Mention five effects that cooking has upon raw food. How is food boiled? How is it roasted or baked? How is it broiled and toasted? How is it fried? What is meant by having pots, pans, and dishes *sterile?* Describe how a greasy dish may be sterilized or thoroughly cleaned. Why is it necessary to keep the hands smooth and clean? Why is the sink properly called the "home sterilizer"? Read again the paragraph describing the kitchen where no germs can live. What does it say about the care of food? About the floor? About the walls and ceiling? About the windows? About the ventilation? What is the most important reason for having a light kitchen? Mention two other reasons why a kitchen should have plenty of light and air. Compare the work of a good cook with the work of a good king. Which is the more important?

For community study

What kitchen with which you are acquainted comes nearest to the description given in this chapter? When you wash the dishes at home, what do you *not* do that is here recommended? Why should a boy learn how to cook well?

CHAPTER V

What happens to vegetables and fruit when they *spoil?* What happens to flour and corn meal? What happens to potatoes? What happens to milk; to meat; to eggs; to butter? Why should we expect good foods to spoil quickly? Name some dry foods not mentioned in this paragraph. How may dry foods be kept from spoiling? What is said about the care of boxes, cupboards, and tins in which dry foods are kept? Name some of the moist foods. Why does cold keep them from spoiling? What is said about the care of the ice-box? The "crops" that grow in milk are germs of various kinds that fall into it. Where do these germs come from? What can the man who milks the cow do to help keep the milk sweet? How should it be bottled? In what sort of a place should it be kept? What is said about "sour germs"? What is said about sour milk? Describe a good "milk-house." What are the three most important things to consider in the care of milk? Why is the fly harmful? What two ways are there of protecting milk from flies? Which is the better way? What is a good proof that a pantry is clean and well ventilated? What do unpleasant smells mean?

For community study

Visit the nearest meat-market and find out how the meat is kept from spoiling. How does your grocer or milkman keep his milk? Which of the suggestions for the care of food can you help to carry out in your home?

CHAPTER VI

What makes a cellar a bad place in which to live? Why is it well to have a cellar under a house? Describe the old-fashioned cellar referred to in the text, or, better still, describe a similar one with which you are acquainted. How does the modern cellar differ from the old-fashioned one? Why should not moist foods be kept in the cellar? Where should moist foods be stored? Why should not milk, butter, and cheese be kept in the cellar? Where should milk be kept? Where should fruit and vegetables be stored? Describe a proper storage-room in the cellar. What foods may properly be stored there? What should not be stored there? Why? "Flora" means plants and "fauna" means animals. What plants lived in the old-fashioned cellar? What animals lived there? What harm do rats and mice do? How would a board of health build a first-class cellar? What is said about draining a cellar? What is one cause of chilblains?

For community study

What cellar that you know of is most like the cellar that a board of health would build? In what particulars could your own cellar be improved? What can you do to improve it?

CHAPTER VII

Why must you keep on cleaning yourself and your home? What is the best way to make cleaning a pleasure? What are the two qualities of a good floor? How may these qualities be secured? What settles on the floor from the air? What is the danger in dry-sweeping with a broom? What is the best way of removing dirt from the floor? How should the windows be washed? Why should soap and hot water not be used when you clean paint? What is the best way to wash paint? How were clothes washed in earlier days? Why is water so useful as a cleanser? What kind of dirt is not affected by water? Of what is soap made? What else will dissolve grease besides soap? Why should you be careful not to use very much soda, potash, or ammonia?

What is said about ammonia? Describe the modern way of washing clothes. What two advantages come from drying clothes out of doors? What is meant by "bluing"? What is the use of it? What is the health value of ironing? What is starching? What is meant by "bleaching"? What two things happen when a piece of cloth is bleached? In what two ways may cloth be bleached?

For community study

When the light is streaming into a room through the window you may see the particles of dust floating in the air. How may you help diminish the amount of this floating dirt in your own home when you clean the floors? When you "dust" the furniture and woodwork? How is the dust kept from rising in the air when the janitor of your school cleans the floor? Which is better to use as a "duster," a feather brush or a damp cloth? Why is it a good plan *frequently* to hang the clothes you wear in the open air?

CHAPTER VIII

What is necessary before one can have a bathroom? From what three sources may water be obtained where there is no town or city supply? What is the advantage and disadvantage of a windmill for pumping water? What power other than wind may be used for pumping? What are some of the advantages of a shower bath? What are some of the advantages of a tub bath? What is the effect of bathing in hot water? Why should hot baths be taken at night? Mention three benefits that come from a daily morning bath in cold water? How cold should the water be? Of what use is a brush when one is bathing? Of what use to the skin is powder? Of what use is cold cream? What is the best kind of oil for the skin? What is the effect on the skin of too much rubbing? Of what are cold creams made? If your skin needs to be improved with powder and cream, what is the reason? What is the best way to get a good complexion? How may the scalp be kept healthy? Can salves, tonics, and "hair restorers" improve the condition of the hair? What is the best way to keep the hair in good condition? What kind of a towel is best to use after a bath? What is said about the care of your bath-towel? Why should every one have an individual towel? How is the internal surface of the body bathed? What sometimes prevents the proper cleansing action of the water we drink and of the internal secretions?

For community study

Who in your neighborhood pumps water to his house with a windmill? Who does it with a gasoline engine? How is water supplied to your house? Do you take a cold bath every morning? Do you enjoy it? If you do not enjoy it, what is the probable reason?

CHAPTER IX

The first paragraph mentions four things that man has been able to do by the use of fire that he could not do before its discovery. What are they? What is meant by the expression "the fire magic made us citizens of the world"? Describe an old-fashioned fireplace and how it worked. How can we always get fresh air into our home? Draw a diagram of a window opened to let out hot air and to let in cold air, indicating by arrows how the air moves. What advantages has a furnace compared with a stove? What advantages has steam or hot-water heating compared with hot-air heating? Of what advantage is it to have a warm bedroom? What disadvantage is there in steam and hot-water heating from the standpoint of ventilation?

For community study

Draw a diagram of a two-story house showing how each room may be warmed by a hot-air furnace. Indicate by arrows the movement of hot air. (If your own house is heated by a furnace, draw a diagram showing the furnace and its cold- and hot-air flues.)

CHAPTER X

Why is it necessary to have an abundance of fresh air in our bedroom at night? What is one of the purposes of sleep? When you breathe through the lungs, what happens? When you breathe through the skin, what happens? In order to allow the skin to breathe properly at night, what kind of nightclothes and bed-coverings should you use? What is a "draft"? Why are drafts across the face particularly healthful at night? What effect have drafts upon the skin? Why should you sleep between sheets? Why should sheets be aired daily and washed frequently? Why is wool a good material of which to make blankets? Name some substitutes for wool. How large should a pillow be? Of what material should it be made? If you were

buying a mattress, what qualities would you look for in it? Describe a model bedroom, referring to location and number of windows, kind of shades, wall-paper, pictures, location of bed. Why is a north room not the best for a bedroom? What can you say about the proper care of your bed and bedroom?

For community study

Compare your own bedroom with the model one described in this chapter. Is there anything you can do to make your room more like the model? Do you sleep with one or more windows open? Do you air your bedding daily before making the bed? Do you give your skin an air bath daily?

CHAPTER XI

Suppose you were planning to build a house. Where would you put the living-room? How large would you make it? How many windows would it have? Describe its furnishing. How would you make it "cozy"? Describe your favorite chair. Are stiff straight chairs desirable in a living-room? What are tables for in a living-room? How many should there be? Why is a low bookcase better than a very high one? Why are rugs on a hard-wood or painted floor better than a carpet? In selecting rugs for the living-room, what size and colors will you choose? What objection is there to a highly polished floor? How nearly do you follow the directions given in the paragraph on sweeping and dusting when you help sweep and dust the living-room at home? What is the best kind of woodwork for a living-room? What is the best kind and the most pleasing color and design for a living-room wall-paper? Of what use are curtains, shutters, and blinds in a modern living-room? What kind of curtains, shutters, and blinds will defeat their real purpose? What is a living-room for? How can you make it serve its purpose? What are the "business hours" in the kitchen? Why is a play-room desirable? Draw a plan of the sort of play-room you would like, showing the different pieces of furniture and the places where your different games would be. Provide in this play-room for your brothers and sisters. In what part of the house should the play-room be located? What should a workshop contain? Where should it be located? What is said about the work bench? About lighting the bench?

For community study

When the author of this book says that the living-room "should not be too tidy," does he mean that it should be in *disorder?* If the living-room is to be a *real* living-room, every one in the family must help make it so. What can you do to help? If you have a workshop or a doll's house at home describe it. How would you like to improve it? If you do not have one, describe the best one you have seen.

CHAPTER XII

Why is a porch that is big enough for a living-room "the healthiest room in the house" for grown people? For children? Describe the old-fashioned porch. Describe the modern porch. To what uses may a porch be put? What kind of furnishing is desirable? What part of the porch is it desirable to screen? Of what use are movable shades? Of what materials are they made? What is a "sleeping-porch"? How should it be built? For whom is it specially desirable? Why is it well to have the back porch large and roomy? Why is it well to have it screened?

For community study

Describe any sleeping-porch that you personally know. Who sleeps there? What do they do in stormy weather? What do the people who use the porch say about its advantages? Where could a sleeping-porch be built on your house?

CHAPTER XIII

Of what use is a barn to children? What useful training may a boy get in a barn? What are some of the dangers connected with playing in a barn? How should the stalls be cleaned? What kind of floors should be laid in stables? How should the drainage of the stalls be provided for? Describe the proper way to take care of a hen- and chicken-house. Describe a modern pigpen. What should be done to keep the pigs healthy and to prevent the pen from becoming a danger to the health of the people who live near? What is meant by calling the manure-heap a "good servant"? What double profit comes from properly caring for the manure-heap? How should the barnyard be kept so that it will be healthful for man and beast? When does the manure-heap become a "bad master"?

For community study

The barn and outbuildings are the peculiar care of boys, as the kitchen, bedroom, etc., are for girls. Let the boys, therefore, take the lead in studying and reporting on the condition and care of barns and outbuildings at home and in the neighborhood. Let them suggest how they may improve conditions for which they are more or less responsible.

CHAPTER XIV

Why are the garden and grounds about the house important? To make them a healthful setting for the home, what should be their size and how should they be kept? What is the most satisfactory way of beautifying the front yard? What objections are there to having trees and tall shrubs close to the house? What is the best use that can be made of a back yard? What should be done with the empty cans and refuse? Why should garbage be kept in a covered can? Why should the garbage-can be washed out regularly? What three ways of disposing of garbage are mentioned? Explain how to protect a well of drinking-water from the refuse on the surface of the ground: from the surface water. Why is it necessary regularly to inspect and clean out a well? Why are wells in villages and cities particularly dangerous?

For community study

Are the grounds about your school well kept? How could they be improved? What can you do to improve them? If you have a well at home from which you draw drinking-water, find out which of the conditions for protecting it mentioned in this chapter are provided. If you have no well at home, make a study of one in the neighborhood to determine whether or not the water in it is properly protected.

CHAPTER XV

In what kind of places did the earliest men live? Describe the earliest houses that were built. What is the advantage of having windows on two sides of a schoolroom? On which sides should they be? From what direction ought light to strike your book when you are reading? On which sides of the room ought the blackboards to be? Of what use are window shades? Why should the ceiling of a schoolroom be at least ten feet high? Why should it not be over fifteen feet high? What

is the common cause of deafness in school-children? How may it be remedied? If you are inclined to breathe through your mouth, what is the probable reason? What causes the air to become impure? How can you tell when the air needs to be changed? Why is it well to exercise while the air is being changed?

For community study

Is the area of all the windows in your schoolroom equal to one fifth the area of the floor? Do you have difficulty in seeing the writing on the blackboards? Can you hear easily all that is said in the schoolroom? Do you know of any building where the windows have been enlarged recently? Is there a house in your neighborhood where the old-fashioned small panes of glass still remain?

CHAPTER XVI

Why do we need warmer houses than the people did who lived long ago? Why do we need a warmer room to sit in than we do to play in? Which is more harmful, to sit in a room that is a little too cool or in one that is a little too warm? Which is more important, warmth or air? Why is it so difficult in winter to keep the right temperature and at the same time have the air fresh? What is meant by "second-hand air"? What is *first-hand* air? What is the only way to get first-hand air into a room? What is the best way to destroy germs in a room? How are the best hospitals heated and ventilated? Describe an "open-window classroom." How do the pupils dress? How do the "open-window classrooms" differ from the "open-air classrooms"? For what kind of children are the open-air classrooms intended? How are the children dressed in these rooms? What is said of the progress made by the children in such rooms?

For community study

Could your schoolroom be turned into an "open-window" classroom? What would need to be done? Explain to your parents the idea of the "open-window" classroom, how you would dress, and the probable result in your school progress, and ask them if they are willing to have your teacher try the plan. Would you yourself like to try it?

CHAPTER XVII

How can you do all your school work well and yet not sit still for a long time? What is the best way to keep the back straight and the shoulders square? How has it been proved that the muscles get tired before the nerves do? What, then, is a good way to rest the nerves? If your eyes get tired while you are reading, how can you rest them? How can you do the largest amount of work in a day? Mention four reasons why blackboards should be provided and used in school. Mention two drawbacks to the usefulness of blackboards. How can each drawback be diminished?

For community study

Find out whether or not your own chair and desk fit you by applying the tests given in this chapter. Are there any blackboards in your schoolroom between windows? Do you notice that it strains your eyes to read much from these boards? When you cannot see the writing on the blackboards easily, what ought you to do?

CHAPTER XVIII

Why is it difficult to keep a schoolroom floor in good repair? Why does a poor floor make a dusty schoolroom? What is done in some schools to keep the dust from rising from the floor? What are the objections to stone and cement floors? How may old floors be improved? Of what material should stairs be made? Why should they be well lighted and free from sharp turns? How should the doors open? What is the peculiar danger in a dark and dirty cellar under a schoolhouse?

For community study

How may school-children help to keep the schoolhouse floors free from unnecessary dirt? How may the janitor help to keep the schoolhouse free from unnecessary dust? Are the stairs in your schoolhouse well lighted, easy to walk over, and free from dangerous landings and turns?

CHAPTER XIX

What objections are there to basement toilets? Where are toilets properly located? Mention four requisites of a good school toilet.

What is said of "deodorizers"? What should be the school standard regarding toilets? What is said about school baths? Why should the cloak-room be well lighted, warmed, and ventilated? What is a rest-room for? What children may need to use it?

For community study

Write a composition on the subject, "The Cloak-Room in Our School." Describe it as it is and state in what particulars it should be changed.

CHAPTER XX

Why is the playground *the best part* of the school plant? How large are the playgrounds connected with some recently built schools? How does this compare with the size of your school yard? What are some of the important lessons we may learn at play? What is said about trying to work when you are tired? What are the conditions for good brain work? What is the trouble when you get tired? What two ways are there of getting *rested?* What is said of learning with our eyes, ears, and memories alone, and of learning also with our hands, feet, and muscles? If we are to play much out of doors in wet weather, in what condition ought the ground to be? What is the advantage of a large open shed? What is said regarding the importance of knowing how to swim?

For community study

What games train the eye to be quick and accurate? What games train the hand? What games train the judgment? What games train us to control our temper? Try the following experiment on yourself: The next time you have a home lesson to prepare, do it when you are feeling rested and see if you can do it in *half* the time you take when you feel tired or sleepy.

CHAPTER XXI

What kind of "grit" is liable to get into the human machine? What is liable to happen if we neglect infectious diseases when they first appear? Where is the best place for us, if we are sick even slightly? If we have an infectious disease, for whom should we be interested besides ourselves? Of what use is a school doctor? What does a school nurse do? Describe a "vacation" school in the country. How will your eyes and ears warn you that you need to rest? What

warnings of approaching illness sometimes appear in the nose and throat? What is the best way to ward off illness? If we are ill, we should keep away from others. If others are ill, what attitude should we take toward them? Does this attitude mean that we are indifferent to them? How may you avoid taking infectious diseases? Mention four things that you should not do, if you wish to avoid infectious diseases.

For community study

What are some of the things that you are accustomed to do thoughtlessly that you will now avoid doing after reading this chapter? What are some of the things you notice older people doing that you now realize may put "grit" into their "machines"?

CHAPTER XXII

Why were pure-food laws not needed in former times? What is the most common cause of food decay? Why is there less danger in eating food that is fresh than in eating that which is old? Why are inspectors needed to look after food that is transported long distances? What precautions are taken by many steamship and railroad companies to protect food? What is the advantage of cold-storage warehouses? How have these been misused? What is the objection to using cellars for cold-storage purposes? What is said of the work of food inspectors in wholesale stores? In retail stores? How is food being put up to protect it from dirt and germs? Why do food inspectors not visit your home? What is meant by the term *food adulteration?* Mention some foods that are easily adulterated. Name some adulterations that are not harmful. Name some that are harmful.

For community study

Make a collection of some of the labels that come on canned, bottled, and boxed food bought for home use. What do the labels say about substances put in to preserve them? Why is it important to get into the habit of reading these labels?

CHAPTER XXIII

How does water get most of its impurities? What is the objection to having a well near a number of houses? What is an artesian well?

From what is the name *artesian* taken? Why is the water taken from an artesian well more likely to be pure than that taken from a shallow well? Why is it dangerous for a city to take its water from a near-by river? Cities are now generally supplied with water from distant reservoirs or from a filtering plant. Explain each method. How is the cost of supplying a city with pure water met? How is typhoid fever spread? What besides germs may make water impure and dangerous to drink? What does *boiling* do to water? What does it not do? What is said about filters?

For community study

Where does the water come from that you drink at school? If it comes from a well, has it been tested and pronounced fit to drink? Is the well properly protected from surface drainage and from dirt? When was it last cleaned out? Where does the water come from that you drink at home? Do you use a filter at home? If you use a filter has it been called a good one by your family physician or the board of health? How many cases of typhoid fever were there in your town last year?

CHAPTER XXIV

Are unpleasant smells injurious to health? How do bacteria or germs of decay purify waste material? What is the work of *soil bacteria?* What would happen if there should be no soil bacteria? How do farmers help soil bacteria to grow? What is there in water that tends to purify it? Why, then, cannot cities pour all their sewage into near-by rivers and ponds? What is likely to happen if much sewage is sent into the sea near large cities? Describe the *chemical-tank* method of "sweetening" sewage. Describe the *septic-tank* method. What is the objection to the old-fashioned cesspool? Why should the sewer pipe leading from a house be small? What is a sewer-gas *trap?* What is this trap for? Describe a proper kind of garbage-can. Describe the process of disposing of garbage by means of a *reduction plant.* By means of an *incinerator.* By burying it in trenches.

For community study

How is sewage disposed of in your town or city? How is garbage disposed of?

CHAPTER XXV

Of what is dust in the country composed? Of what is dust in the city composed? How does dust get into our systems? Mention some kinds of work that are particularly unhealthful because of dust. How is dust kept down in the streets and roadways by sprinkling? By different kinds of pavement? Why do roads and streets make good playgrounds? Why are they undesirable for use as playgrounds?

For community study

How is dust kept down in the streets or roads of your town or city? Are there factories in your neighborhood that give off objectionable dust? In choosing one's work, what is one of the things that should be considered?

CHAPTER XXVI

In what particulars are cities like animals? Why must a city have "lungs"? What was the purpose of the "park" in former days? What is its purpose to-day? What facilities for play and amusement are now provided in parks? What is said about some parks in foreign countries? What is said about the public "country clubs" in such cities as Chicago? Where are picture galleries and museums often placed? Why is the park an appropriate place for these institutions?

For community study

Is there a park in your neighborhood? Is there need of one? Mention some of the interesting things you have seen in any park you have visited. What is our duty when we visit a park that is provided by the community for our health and enjoyment?

CHAPTER XXVII

What things are necessary to make a home comfortable and healthful to live in? Which of these things is often lacking in the crowded parts of large cities? What do building and housing laws require in most cities? Why are such laws needed? How did the unhealthful conditions in large cities come about? How does the high price of land help to remedy these conditions? How are they remedied in

many European cities? In many cities what changes are being made in the streets? What is said about boulevards, parks, etc.? What about the location of factories and freight yards?

For community study

Are there any overcrowded sections in your town or city? Are there any streets that are too narrow to accommodate the traffic that uses them? Does the town or city in which you live have any building or housing laws?

CHAPTER XXVIII

What are the greatest carriers and spreaders of disease germs? What is said of the struggle between human beings and insects? Name some insects that kill a great many people. Name the helpful insects. What damage do birds do? What service do they render? What is said about swallows? What is the relation between worms and flying insects? What is the best way to kill flying insects? Describe three ways in which mosquitoes may be destroyed. How may a town or a city be rid of mosquitoes? How many kinds of flies are there? Which kind is most troublesome to human beings? What do flies indicate? How, then, can we be rid of them? Describe the conditions under which the fly hatches. What three ways are there of preventing flies from hatching in manure piles? Where can you get further information about flies? What two kinds of damage do rats and mice do? How can we get rid of rats and mice?

For community study

What measures are taken at home to protect the family from flies and mosquitoes? Are there any breeding-places in your yard or near your house in which these pests can breed? Is your town doing anything to limit their breeding? Is your State doing anything to limit it? What can you do at home and at school to limit it?

CHAPTER XXIX

Why must people in crowded cities take greater care to guard against infectious diseases than people in country districts? How does yellow fever spread? How has it been stamped out? What are the four things mentioned as the best disease-preventers? What are

quarantine stations? How are people warned that a person has an infectious disease in a certain house? What is meant by *quarantining* a house? What is *vaccination?* What has been the result in some European countries of compelling every one to be vaccinated against smallpox? When the vaccination *takes*, what has happened? If you have an infectious disease and recover, why are you not likely to have that disease again? What insects help to spread disease? What animals help to spread disease? What is said about tramps?

For community study

Is every child in your school required by law to be vaccinated? When were you last vaccinated? Did it "take"? When you see a card on a door stating that a person in the house has an infectious disease, what should you do? When you are "quarantined" because of illness at home, why should you avoid playing with other children? Why should you avoid playing with children who are quarantined?

CHAPTER XXX

How may heart disease be prevented? Is tuberculosis increasing or decreasing in this country? In what ways do you think that you can help fight the Great White Plague in the coming years? Do you think that it is more important to keep away from a person who has pneumonia than from a person who has chickenpox? Why? Can we do anything to avoid kidney disease? Mention a few ways. What causes apoplexy? Give several reasons why health authorities should insist on clean milk, water, and food.

For community study

Find out as much as you can about what is being done to reduce the amount of tuberculosis in your community. How many babies under one year of age died in your community during the last five years? (Infant mortality is the number of deaths of babies under one year of age for each thousand babies born during any given year. To estimate it, divide the number of births for the year by one thousand, and divide the number of deaths of babies under one year of age by the quotient.) New York State recently had an infant mortality of 97. How does your community compare with this? (If your community has less than 100,000 population, fairer results will be obtained by taking the average for the last five years.) Do you think that good infant welfare work pays? Why?

CHAPTER XXXI

What sort of a place was the factory of former days? How has the introduction of machinery helped to change these unhealthful conditions? What has caused manufacturers to take greater care of the people who work for them? What should you consider when you choose your life-work? Why have different kinds of education been introduced into schools? What is said about the results of shortening hours of labor? How are the best factories now built? Where are they built? What provision is now being made to protect workmen against accidents? What provisions are made to protect against fire? Against poisonous gases and other injurious products of manufacture? What are intelligent employers doing for the general health of their employees?

For community study

If a modern factory has been built in your neighborhood, compare it with an old-fashioned factory in respect to (*a*) the material of which it is built; (*b*) the amount of window space; (*c*) the protection of workers from machine accidents. Is there a lunch-room in it for workers? Is it surrounded by ample grounds?

CHAPTER XXXII

What rules should you follow when you step from the sidewalk to cross a street? What four rules should be followed in getting on and off street-cars? What are the four "rules of the road" in this country? What are the advantages of having well-lighted streets? What are the effects of the "smoke nuisance" on property? On health? How may the smoke nuisance be abated?

For community study

Do you yourself follow the rules set down in this chapter when you cross the street? When you get on and off street-cars? Is there a "smoke nuisance" in your town or city? What factories are responsible for it?

CHAPTER XXXIII

Who in the community can help most in making a clean, healthful, and beautiful town or city? Describe the most important thing you can do to make a healthy community. Describe five ways in which you can help make a healthful home. Describe four ways in which you can help make a healthful school. In what three ways can you help make your town or city healthful and beautiful?

GLOSSARY

Ac′id (ăs′ĭd). A substance (usually sour-tasting) that neutralizes alkalies (usually with fizzing) and combines with other substances to form salts.

A cous′tics (ȧ kōōs′tĭks). The science of arranging a building for the transmission of sound.

Ad′e noid (ăd′ē noid). An enlargement of a gland in the back of the nose.

A dul′ter ate. To make impure by addition of a foreign or cheaper substance.

Al′co hol. A colorless liquid formed by the fermentation of starch-sugars or certain other substances. It is highly inflammable and burns without smoke or waste; it is a stimulant and an antiseptic.

Al′i men′ta ry ca nal′. The food tube, or digestive tube, extending from the lips and nose to the end of the rectum, including its branches and attachments.

Al′ka li (ăl′ka lī). A substance that neutralizes acids, forming salts. (See **Acid.**) It also combines with fats to form soaps.

A noph′e les. A genus of mosquito whose bite is the means of infecting a human being with malaria.

An′ti tox′in (ăn′tĭ tŏx′ĭn). A substance which has the power of neutralizing poisons produced in the body by the bacteria of some disease.

Ar′ter y (är′tẽr ĭ). One of the branching blood vessels which carry the blood from the heart to the different parts of the body.

Asth′ma (ăz′ma). A disease characterized by difficulty in breathing.

Ba cil′lus (bȧ sĭl′lŭs). A large family of bacteria, some dangerous (as typhoid bacilli) and some helpful (as the soil bacilli).

Bac te′ri um (băc tē′rĭ ŭm). A large group of tiny cell-like structures, millions of which may be found in a single drop of fluid. Some are harmful, producing disease, and some helpful, such as the soil bacteria.

Bron chi′tis (brŏn kī′tĭs). Inflammation of the bronchial tubes.

Bu bon′ic plague (bū bŏn′ĭc plāg). A deadly infectious fever also known as "The Black Death."

Car′bon di ox′ide (cär′bŏn dī ŏx′ĭd). A heavy colorless gas, poisonous and impossible to breathe.

Ca rot′id arteries. The pair of arteries which may sometimes be noticed throbbing in the neck.

Ca tarrh' (kȧ tär'). An acute inflammation of the membranes of the nose.

Cell. The simplest form of living matter, with power to grow, reproduce itself, and with others of its kind build up a living fabric.

Chol'er a (kŏl'ẽr ȧ). Any one of a number of digestive diseases, such as Asiatic cholera, cholera infantum, etc.

Chrys'a lis (krĭs'ȧ lĭs). The pupa stage of certain insects, usually passed in a more or less hard case or shell.

Clin'ic (klĭn'ĭk). An institution connected with a medical college or hospital where patients are treated without charge.

Com mu'ni ty (kŏm mū'nĭt ĭ). A body of people having a common organization or interests, or living in the same place under common laws. It may be used of a neighborhood, a town or city, a county, state, or nation.

Con gest'ed (kŏn jĕst'ĕd). Overcrowded with population, used in speaking of a district.

Con ta'gion (kŏn tā'jŭn). The transmission of a disease from one person to another by direct or indirect contact.

Con tam'i nate. To soil, stain, or corrupt by contact.

Crem'a to ry (krĕm'ȧ tō rÿ). A furnace for burning rubbish or refuse.

Crib. A heavy framework of logs or beams filled with stone or rubble and sunk in a lake or river to protect the city water intake pipe.

Death-rate. The ratio of the number of deaths for a given period to the population.

De o'dor iz'er (dē ō'dẽr īz'ẽr). A substance that destroys offensive odors. (See **Disinfect.**)

Di ges' tion (dĭ jĕs'chŭn). The process of changing food in the alimentary canal into a form absorbable by the blood.

Diph the'ri a (dĭf thē'rĭ ȧ). An acute infectious disease affecting the throat.

Dis'in fect' (dĭs'ĭn fĕkt'). To free from infectious or contagious matter; to destroy germs and make harmless.

Dys'en ter y (dĭs'ĕn tĕr ĭ). A disease of the large intestine.

En'to mol'o gy (ĕntō mŏl'ō jĭ), Department of. A department of the National Government devoted to the study of insect pests.

Ep'i dem'ic (ĕp'ĭ dĕm'ĭk). Any disease which, spreading widely, attacks many persons at the same time.

E rup'tion (ê rŭp'shŭn). A rash on the skin, as in measles.

Er'y sip'e las (ĕr'ĭ sĭp'ê lăs). An acute infectious disease of the skin.

Fa tigue' (fȧ tēg'). A condition in which the body cells are worn out faster than they build up, so that waste matter gathers in the system and poisons it.

Fau'na. The animals of a given place or region.

Fer'men ta'tion (fẽr'mĕn tā'shŭn). A chemical change in plant or animal substance, produced usually by the action of bacteria, in the process of which the substance is broken up and new substances formed.

Flo'ra (flō'rȧ). The plants of a given place or region.

For'ma lin (fôr'mȧ lĭn). A liquid disinfectant.

Germ. The simplest form of life from which a living organism develops — a bacterium or bacillus.

Ger'mi cide (jẽr'mĭ sīd). A chemical compound used to kill bacteria or bacilli.

Gland. A part, or organ, that has the power of making a secretion peculiar to itself.

Hy'gi ene (hī'jĭ ēn). The science of preserving health.

Hy'po der'mic (hī'pȯ dûr'mĭk). Pertaining to the parts under the skin.

In cin'er a tor (ĭn cĭn'ẽr ā tẽr). A furnace for burning refuse or rubbish.

In fec'tion (ĭn fĕk'shŭn). Communication of a disease from one person or organism to another.

In'flu en'za (ĭn'flo͞o ĕn'zȧ). A feverish infectious disease affecting the throat and the entire system.

In oc'u late (ĭn ŏk'ů lāt). To communicate a disease to a person or animal by inserting its virus in the skin or flesh.

Ju'gu lar (jo͞o'gů lar). A large vein in the neck.

Lab'o ra to ry (lăb'ȯ rȧ tȯ rĭ). The workroom of a chemist or scientist.

Lar'va (lär'vȧ). Any young insect from the time it hatches to the time when it goes into the chrysalis — a caterpillar or "worm."

Mag'got (măg'ŏt). The footless larva of any fly.

Ma la'ri a (mȧ lā'rĭ ȧ). A feverish illness produced through the bite of the Anopheles mosquito.

Mea'sles. A contagious feverish disease marked by an eruption of red spots.

Mi'cro scope (mī'krȯ skōp). An optical instrument for making an enlarged image of an object too small to be seen by the naked eye.

Mus'ca do mes'ti ca (mŭs kȧ dȯ mĕs'tĭ kȧ). The Latin name for the common house-fly.

Ox′y gen (ŏks′ĭ jĕn). A gaseous element in the air necessary tc respiration. It occurs also in water and elsewhere.

Pel lag′ra (pĕl lăg′rȧ). A disease common in the Southern United States and other warm climates.

Pneu mo′ni a (nū mō′nĭ ȧ). Inflammation of the lungs.

Pol lute′ (pŏl lūt′). To make foul, impure, or unclean.

Pre serv′a tive (prē sẽrv′ȧ tĭv). A substance having the power of preserving other substances from decay.

Pu′tre fac′tion (pū′trē făk′shŭn). Act or process of becoming rotten.

Rash. An eruption on the body.

Sa li′va (sȧ lī′vȧ). Secretion from the salivary glands: spittle.

Se cre′tion (sē krē′shŭn). Any substance separated from the blood by a gland and changed into a new form.

Seep′age (sēp′āj). The ooze, or liquids which pass through the soil and contaminate wells or water-supplies.

Se′rum (sē′rŭm). The watery portion of the blood.

Sew′age (sū′ăj). Liquid refuse carried away from houses and factories by drains.

Sol′vent (sŏl′vĕnt). A substance, usually liquid, having the power of dissolving something.

Spores. Tiny grains of flowerless plants which correspond to seeds.

Steg′o my′i a (stĕg′ō my′yȧ). The variety of mosquito whose bite is the means oi infecting a human being with yellow fever.

Ster′ile (stĕr′ĭl). Free from all reproductive spores or germs.

Stim′u lus (stĭm′ū lŭs). That which excites a temporary increase of vital action either in the whole organism or in any of its parts.

Sto mox′ys cal′ci trans (stō mŏks ĭs′ kăl′sĭ trăns). The Latin name of the stable fly.

Tem′per a ture. Degree of heat or cold.

Tet′a nus (tĕt′ȧ nŭs). Lockjaw.

Ton′sil lī′tis (tŏn′sĭl lī′tĭs). Inflammation of the tonsils.

Tox′in (tŏks′ĭn). A poisonous product formed by harmful bacteria.

Tu ber′cu lo′sis (tū bẽr′kū lō′sĭs). A disease producing tubercles in the internal organs, usually in the lungs.

Ty′phoid (tī′foid). A contagious fever produced by a particular bacillus.

Ty′phus (tī′fŭs). A contagious fever, marked by red spots.

Vac′cine (văk′sĭn). The virus used to produce immunity from a disease.

YB 36133

572565

RA431
H8

UNIVERSITY OF CALIFORNIA LIBRARY